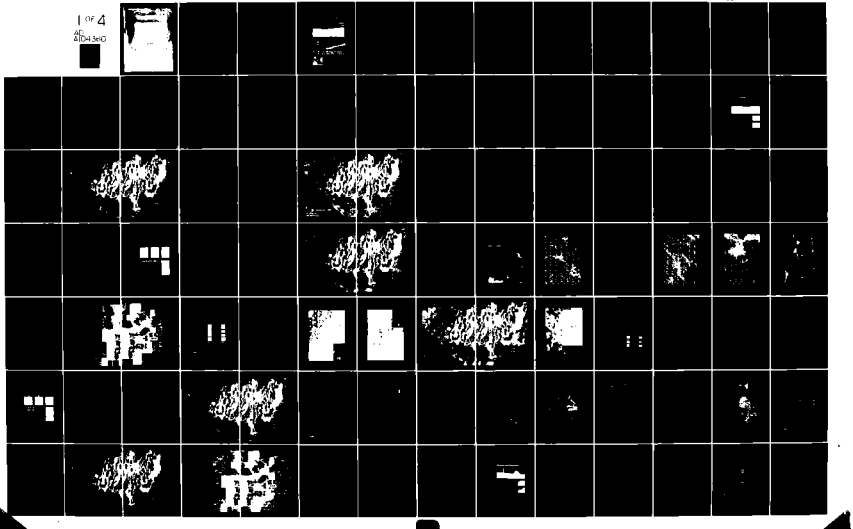
AD-A104 360 AIR FORCE SYSTEMS COMMAND WASHINGTON DC F/G 5/3
DRAFT ENVIRONMENTAL IMPACT STATEMENT, MX DEPLOYMENT AREA SELECT--ETC(U)
DEC 80
UNCLASSIFIED AFSC-TR-81-60 NL

1 OF 4
AD A104 360



Unclassified

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER AFSC-TR-81-60	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE *(and Subtitle)* Draft Environmental Impact Statement-MX Deployment Area Selection-Environmental Consequences to the Study Area & Operating Base Vicinities-Vol IV Part III		5. TYPE OF REPORT & PERIOD COVERED Draft-December 80 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s)		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Henningson, Durham & Richardson Santa Barbara California		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Deputy for Environmental and Safety Office of the Secretary of the Air Force Pentagon, Washington DC		12. REPORT DATE December 1980 13. NUMBER OF PAGES 282
14. MONITORING AGENCY NAME & ADDRESS*(if different from Controlling Office)* Ballistic Missile Office ATTN: AFRCE-MX BOX EIS Norton AFB DC		15. SECURITY CLASS. *(of this report)* Unclassified 15a. DECLASSIFICATION DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT *(of this Report)* Unclassified Unlimited		Draft Environmental Impact Statement. MX Deployment Area Selection and Land Withdrawal/Acquisition DEIS. Volume 4, Part III. Environmental Consequences to the Study Regions and Operating Base Vicinities.
17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)* Environmental Impact Statements MX MX Deployment Area Selection		
20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)* The method used to evaluate quantifiable impacts of the M-X program consisted of the following steps. (1) Identifying fuel and electrical power needs of the M-X system and support community. (2) Obtaining present and projected figures for power and fuel consumption and availability on local, state, regional, and national levels, where applicable. (3) Mapping of existing and proposed power and fuel (con't)		

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

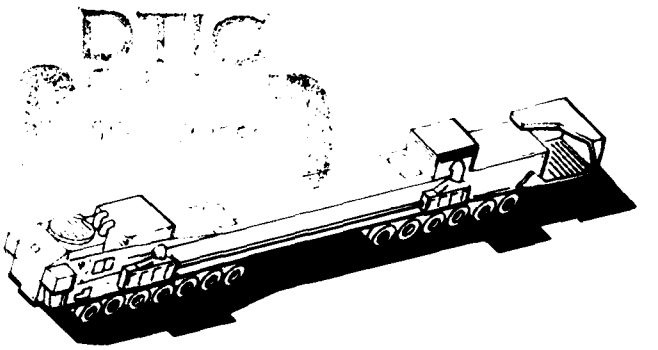
Item 20 (con't)

lines in regions.

(4) Comparing demand and supply to determine potential impacts.

IV
Part III

Environmental Consequences to the Study Regions and Operating Base Vicinities



Environmental Impact Analysis Process

DEPLOYMENT AREA SELECTION AND LAND WITHDRAWAL/ ACQUISITION DEIS

DEPARTMENT OF THE AIR FORCE

"Original contains color plates: All DTIC reproductions will be in black and white"

DEPLOYMENT AREA SELECTION
AND
LAND WITHDRAWAL/ACQUISITION DEIS

CHAPTER 1: PROGRAM OVERVIEW

CHAPTER 1 PRESENTS AN OVERVIEW OF THE M-X SYSTEM AND THIS EIS INCLUDING:

- A DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES, INCLUDING SCHEDULE AND RESOURCE REQUIREMENTS
- AN OVERVIEW OF THE TIERED M-X ENVIRONMENTAL PROGRAM THAT INVOLVES SITE SELECTION AND LAND WITHDRAWAL
- A PRESENTATION OF PUBLIC SAFETY CONSIDERATIONS WITH PHYSICAL SECURITY AND SYSTEM HAZARDS
- A SUMMARY OF FEDERAL AND STATE AUTHORIZING ACTIONS ASSOCIATED WITH CONSTRUCTION AND OPERATIONS

CHAPTER 2: COMPARATIVE ANALYSIS OF ALTERNATIVES

CHAPTER 2 COMPARES THE ENVIRONMENTAL IMPACTS OF ALTERNATIVE M-X SYSTEM AND OPERATING BASE COMBINATIONS. DETAILS INCLUDE:

- THE SELECTION OF LOCATIONS FOR TWO SUITABLE DEPLOYMENT REGIONS, 200 CLUSTERS, AND SEVEN ALTERNATIVE OPERATING BASES
- PRESENTATION OF CONCEPTUAL CONSTRUCTION SCHEDULES, PERSONNEL REQUIREMENTS, AND RESOURCE NEEDS FOR EACH ALTERNATIVE
- COMPARATIVE ENVIRONMENTAL ANALYSIS BY ALTERNATIVE FOR EACH RESOURCE PRESENTED IN CHAPTERS 3 AND 4

CHAPTER 3: AFFECTED ENVIRONMENT

CHAPTER 3 DESCRIBES THE POTENTIALLY AFFECTED ENVIRONMENT IN NEVADA, UTAH, TEXAS, AND NEW MEXICO. ENVIRONMENTAL FEATURES OF BOTH BI-STATE REGIONS AND OF OPERATING BASE VICINITIES ARE PRESENTED. RESOURCES ADDRESSED INCLUDE:

- WATER, AIR, MINING, VEGETATION, AND SOILS
- WILDLIFE, AQUATIC SPECIES, AND PROTECTED PLANT AND ANIMAL SPECIES
- EMPLOYMENT, POPULATION, PUBLIC FINANCE, TRANSPORTATION, CONSTRUCTION RESOURCES, ENERGY, LAND USE, AND RECREATION
- CULTURAL RESOURCES, NATIVE AMERICAN CONCERNS, ARCHAEOLOGICAL AND HISTORIC FEATURES

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES TO THE STUDY REGIONS AND OPERATING BASE VICINITIES

CHAPTER 4 EXPANDS THE CHAPTER 2 ANALYSIS FOR EACH RESOURCE IN CHAPTER 3. ADDRESSING THE QUESTIONS RAISED IN SCOPING, CHAPTER 4 DISCUSSES THE FOLLOWING TOPICS ON A RESOURCE BY RESOURCE BASIS.

- THE REASON EACH RESOURCE IS IMPORTANT AND THE SOURCE OF SIGNIFICANT DIRECT AND INDIRECT IMPACTS
- THE INTERRELATIONSHIPS BETWEEN RESOURCES AND KEY CAUSES OF SHORT- AND LONG-TERM IMPACTS SUCH AS AREA DISTURBED AND POPULATION GROWTH
- MITIGATIVE MEASURES WHICH POTENTIALLY REDUCE IMPACTS
- A MATRIX OF POTENTIAL IMPACT SEVERITY BY GEOGRAPHIC AREA FOR THE PROPOSED ACTION AND EACH ALTERNATIVE

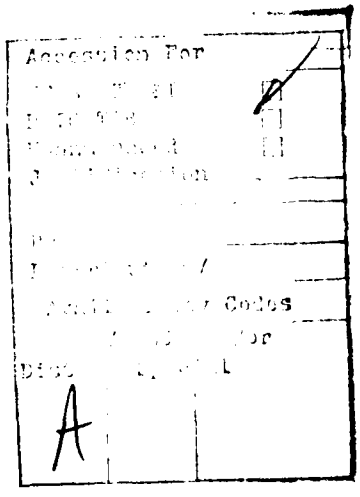
CHAPTER 5: APPENDICES

CHAPTER 5 CONTAINS AN M-X BASING ANALYSIS REPORT WITH APPLICATION OF SELECTION CRITERIA TO CANDIDATE BASING AREAS. ADDITIONAL SECTIONS INCLUDE:

GLOSSARY
ACRONYMS
LIST OF PREPARERS
DISTRIBUTION LIST
BIBLIOGRAPHIC NOTE
REFERENCES
INDEX

3458-8

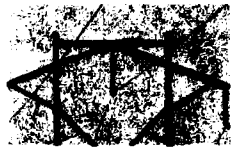
CONTENTS



LIST OF FIGURES

LIST OF TABLES

Energy



ENERGY

INTRODUCTION (4.3.2.10.1)

The M-X program would require electrical power and fuels of various forms supplied on both a relatively short term (2-5 years) for construction needs and a longer term (about 30 years) for operational requirements. At a time of diminishing energy supplies and increasing competition for energy, including gasoline, the potential effect of the project on energy resources must be considered. Possible effects on electrical power resources include increased power generation plant operation with the attending potential impacts on air quality, water consumption, wastewater generation, and disposal of fuelgas scrubbing sludges, and ash. Power transmission and distribution systems may have to be built in order to provide service to remote areas or to be upgraded to meet increased demands. The associated right-of-way acquisition and maintenance may preclude the use of affected land for other purposes. New lines and substations could have an adverse visual and aesthetic impact. Finally, the extensive cable plowing or trenching required for installation of the underground cables for power distribution to the clusters would have a temporary disruptive effect.

The primary forms of fuels considered are natural gas, gasoline, diesel fuel, and fuel oil. Increased energy consumption will result in regional and local effects. These effects include the construction of additional fuel storage and distribution facilities and potential readjustment of current state fuel allotments. Truck delivery of fuels would create fugitive dust and air pollution during the construction period. Fuel handling facilities and marshalling areas required to store construction materials between delivery and installation will be fenced, and entrance to the areas will be restricted. Above ground pipelines would form barriers to animals and vehicles and would require a right-of-way corridor to allow the fuel vendors to inspect and maintain them. These right-of-way corridors will be typically 100 feet wide. Gasoline and diesel fuel allocation and distribution may have to be expanded to a greater degree in Nevada/Utah than in Texas/New Mexico. Fuel allocations would likely be adjusted to conform with M-X direct and induced requirements based on current procedures under the Emergency Petroleum Allocation Act of 1973 and implementing regulations.

The Department of Energy administers allocation programs through regional offices. To assure equitable distribution of petroleum products, the allocation

regulations "freeze" supplier/purchaser relationships as of a base period. One basis for an exception to mandatory allocations is a dramatic increase in population, which causes a corresponding increase in demand. New retail outlets then must apply for assignment of a base period volume. State set-asides are intended for use in alleviating temporary hardships and may not be available for M-X need. This distribution is especially important to the gaming industry in Nevada. This industry is based on commute patterns chiefly from California and is very sensitive to fuel supplies.

There are two favorable impacts that may occur as a result of M-X deployment. The first is that many persons, civilian and military, would be relocating from harsher climates where energy requirements are higher. As a result of construction complying with the latest state and federal energy conservation standards, and employing solar features, energy consumption for homes and work areas most likely would be less. On a national basis, therefore, energy consumption may be reduced. The second is the development and utilization of renewable energy resources which may be used for both technical and support facilities. A major program is underway to develop alternative energy systems which can provide reliable operating power for the M-X system. The program is a joint Department of Defense and Department of Energy effort. The systems under study include photovoltaics, wind, solar energy thermal troughs, solar thermal dishes, solar thermal central receivers, geothermal, and biomass technologies such as alcohol and methane production. These systems may be employed either separately or integrated with conventional sources. The Nevada/Utah region, in particular, has excellent potential for geothermal development because of the number of geothermal resources. Both regions have excellent solar potential because of the high number of clear bright days. Developable wind energy resources are likely to be found in the mountains, ridges, and passes of the Nevada/Utah Basin and Range Province and in the windy open areas of the Texas/New Mexico High Plains Region.

The method used to evaluate quantifiable impacts of the M-X program consisted of the following steps.

1) Identifying fuel and electrical power needs of the M-X system and support community.

2) Obtaining present and projected figures for power and fuel consumption and availability on local, state, regional, and national levels, where applicable.

3) Mapping of existing and proposed power and fuel lines in regions.

4) Comparing demand and supply to determine potential impacts.

PROPOSED ACTION (4.3.2.10.2)

DDA Impacts

Figure 4.3.2.10-1 shows the existing and proposed power transmission lines for the Nevada/Utah region with an overlay of the M-X system. Figure 4.3.2.10-2 shows a conceptual design of a possible layout for M-X project power transmission lines. The actual system and location would be developed by area utilities in

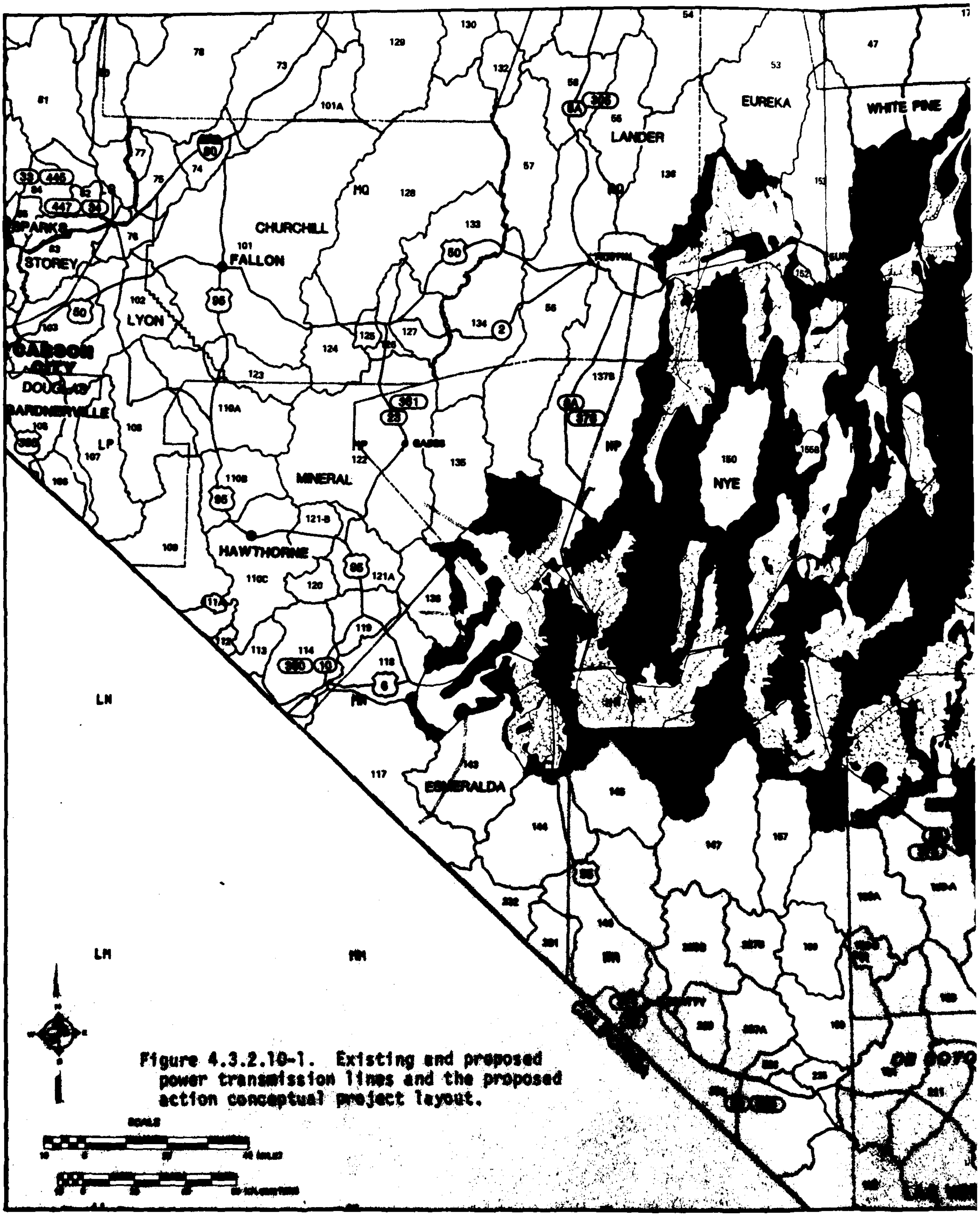
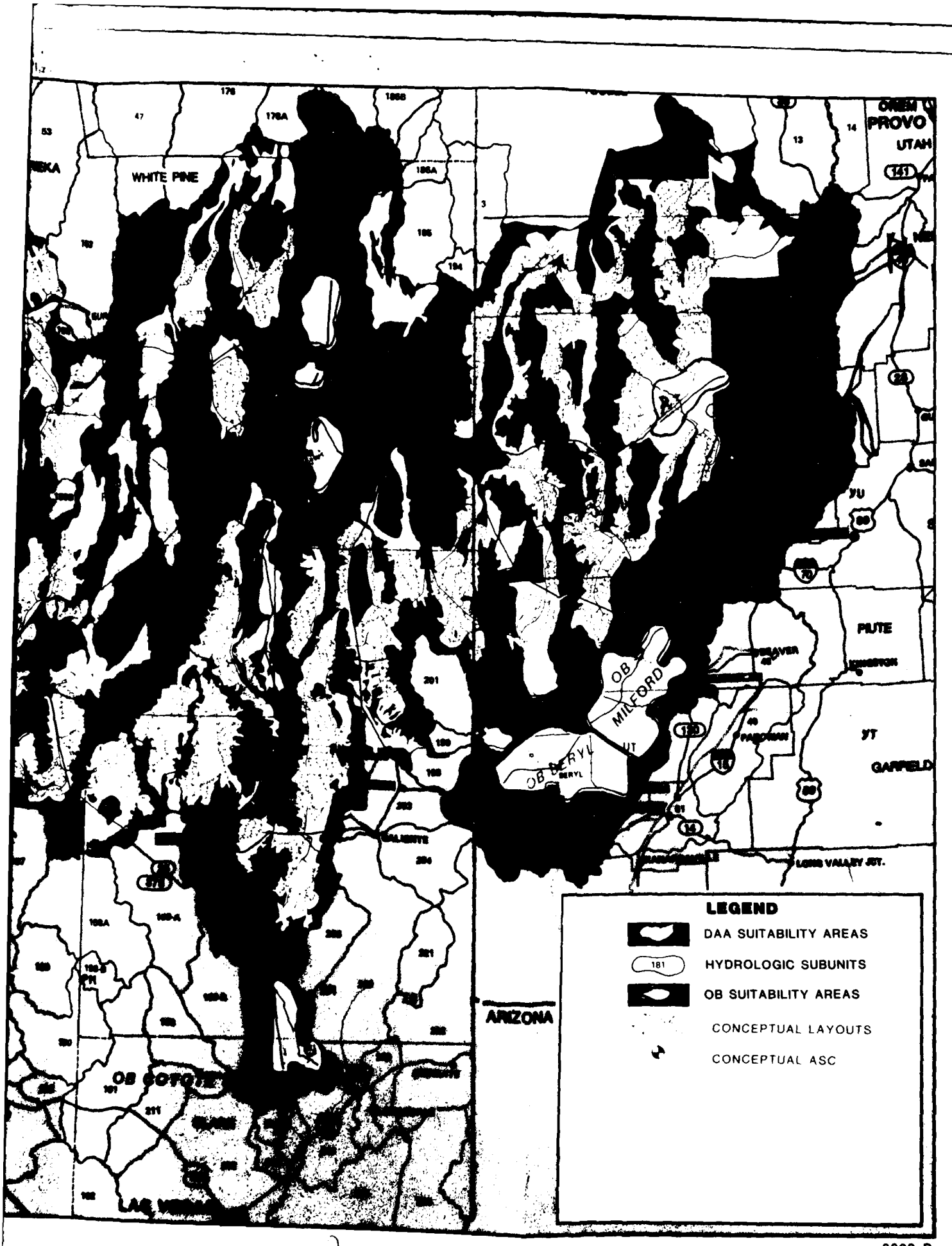


Figure 4.3.2.10-1. Existing and proposed power transmission lines and the proposed action conceptual project layout.


WHITE PINE
PROVO
UTAH
PIUTE
GARFIELD
OB MILFORD UT
OB BERYL
BERYL
ARIZONA
LAS VEGAS
OB SOFTITE
LEGEND
DAA SUITABILITY AREAS
181
HYDROLOGIC SUBUNITS
OB SUITABILITY AREAS
CONCEPTUAL LAYOUTS
CONCEPTUAL ASC

3222-D

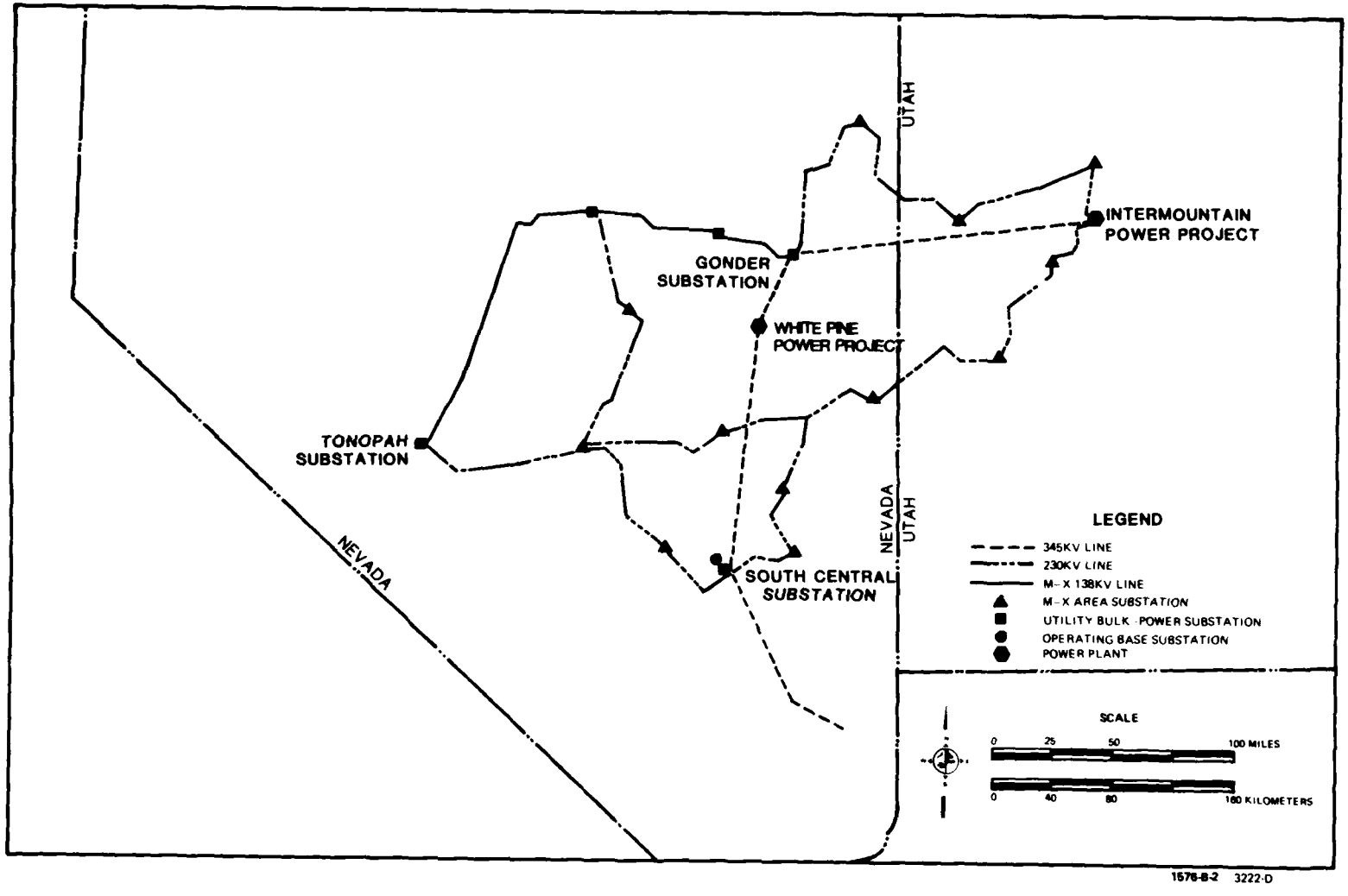


Figure 4.3.2.10-2. Nevada/Utah transmission system configuration.

coordination with the Air Force. Figure 4.3.2.10-3 shows existing and proposed fuel pipelines to indicate the relative scarcity of fuel supply lines in the area. Table 4.3.2.10-1 presents a summary of the energy requirements by alternative for the entire system, including the support community.

The induced effect of M-X on the total electrical energy situation would be minor, about one percent of the excess available power (1989) in the region. No new generation facilities would have to be supplied besides those previously proposed for the area. These facilities include the Intermountain Power Project, the White Pine Power Project, and the Harry Allen Power Plant. Timely coordination between the local utilities and the Air Force would be necessary to ensure minimum effect of the M-X system on the utility. Conflicts between previously proposed and approved power transmission line routings and the M-X system will have to be resolved. An example of this is the conflict between the Intermountain Power Project in the Milford, Beryl, and Coyote Spring Valley areas and the conceptual operating base locations. The impacts on the environment related to the proposed power plants, power transmission systems, and power distribution systems have already undergone reviews and environmental inquiries prior to M-X being considered.

Development and use of alternative energy systems may improve the energy supply in the M-X deployment regions, and possibly the nation.

Potential adverse impacts on the energy resources may be for:

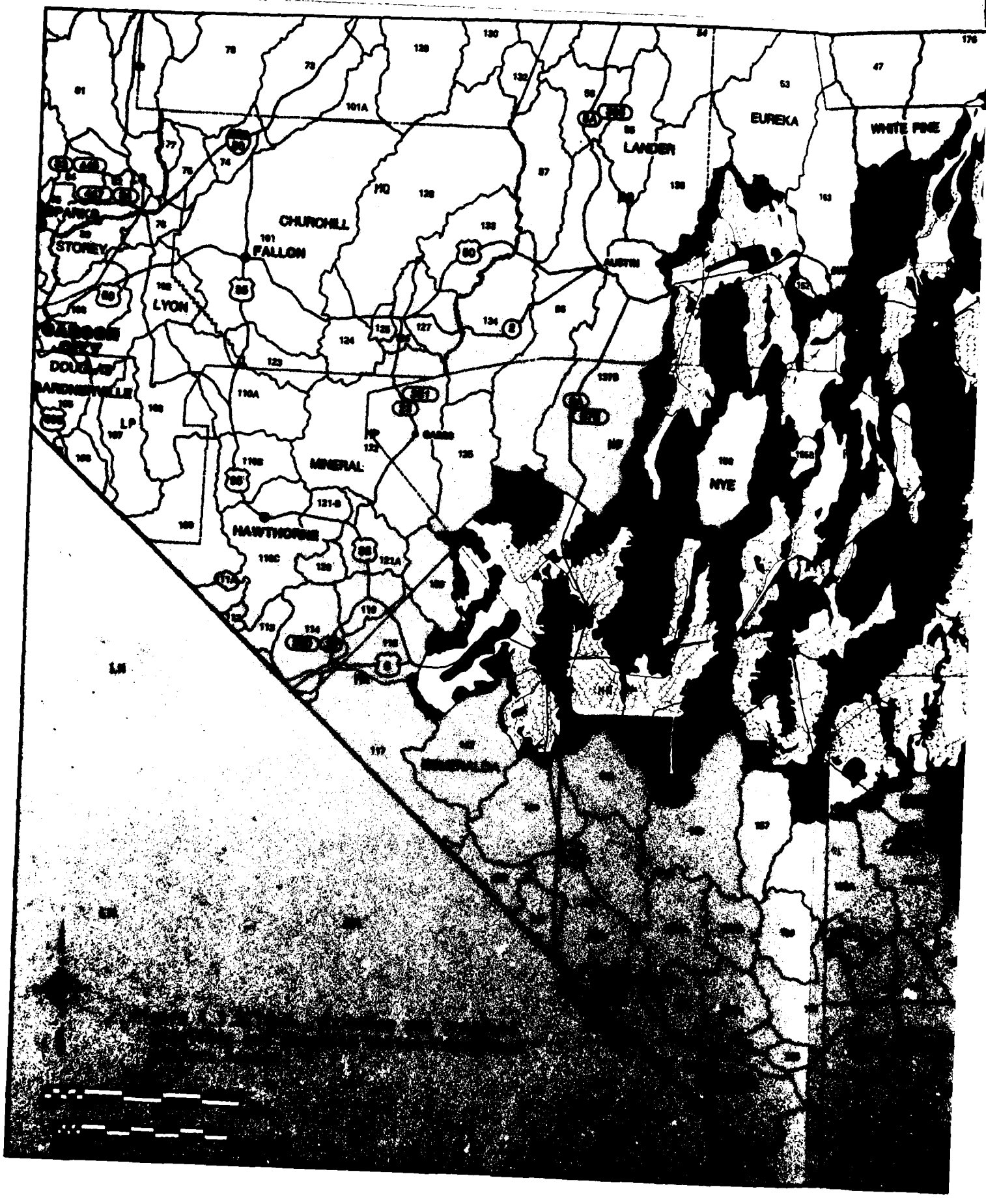
- Fuel: Storage and distribution facilities for fuels would not be a major impact within the DDA because of the extended area covered by the system. The concerns of land use, spills, explosions, and air pollution impacts from these facilities are considered minor.

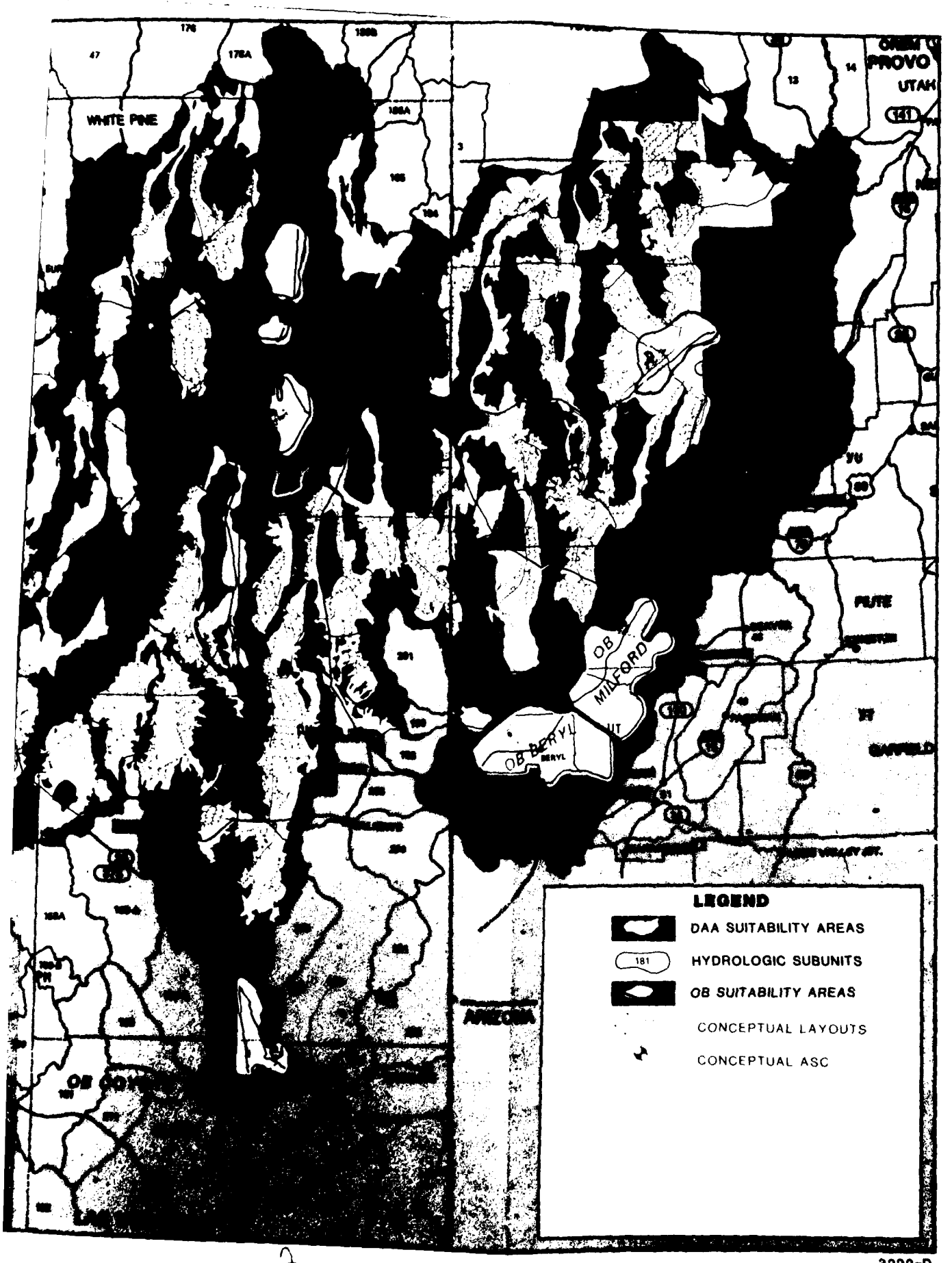
  Construction of fuel pipelines through the DDA as a result of M-X deployment would not be expected to be extensive. The impacts are not considered to be significant.

  Air pollution, as discussed under the section on air quality, resulting from the combustion of fuels would not be expected to produce a significant impact.

- Electrical Power: Electrical power transmission and distribution would create aesthetic and right-of-way impacts, especially in pristine areas. The impact would be moderate because in many cases the lines would be along existing roads. Alternative energy systems may produce a significant positive impact by reducing the electric load of the system and the need for power transmission lines. Development of power transmission and distribution systems may, on the other hand, permit additional development of the region and may be a significant impact on growth. M-X power consumption would not likely limit development by limiting growth because the region as a whole has sufficient power capability with the M-X induced demand being relatively small. Therefore this impact is not considered significant.

During the M-X construction phase most of the energy requirements would be for petroleum products for operating vehicles, construction equipment, and deisel


EUREKA
WHITE PINE
LANDER
CHURCHILL
FALLON
STOREY
LYON
MINERAL
HAWTHORNE
NYE


WHITE PINE
PROVO
UTAH
PIUTE
OB MILFORD
OB BERYL
BERYL
ARIZONA
LEGEND
DAA SUITABILITY AREAS
181
HYDROLOGIC SUBUNITS
OB SUITABILITY AREAS
CONCEPTUAL LAYOUTS
CONCEPTUAL ASC

2

3222-D

Table 4.3.2.10-1. Summary of energy requirements by alternative, annual consumption.

ALTERNATIVE	CONSTRUCTION (1986)						OPERATIONS (1992)					
					ELECTRICAL						ELECTRICAL	
	GASOLINE 10^6 GA	DIESEL 10^6 GA[a]	FUEL OIL 10^6 GA	NATURAL GAS 10^6 CF	DEMAND MW	TOTAL USE 10^3 MWH[b]	GASOLINE 10^6 GA	DIESEL 10^6 GA	FUEL OIL 10^6 GA	NATURAL GAS 10^6 CF	DEMAND MW	TOTAL USE 10^3 MWH
P/A	104	52	19	—	75	235	28	22	10	—	258	1,225
1	101	52	18	—	73	230	27	22	10	—	258	1,226
2	106	52	19	—	76	236	26	22	10	—	256	1,221
3	80	52	20	—	75	228	21	22	15	—	262	1,212
4	78	52	17	—	63	189	25	22	12	—	259	1,225
5	88	52	22	—	85	249	22	22	15	—	262	1,211
6	85	52	19	—	71	213	26	22	12	—	259	1,223
7	151	41	—	2,124	68	261	21	22	—	1,570	260	1,236
8	111	44	9	982	80	240	24	22	4	710	261	1,241

4043

[a]Annual diesel fuel quantities shown include estimated diesel fuel required by the standby diesel generators and JP-4 fuel.

[b]Annual electrical usage shown excludes estimated electricity generated by standby diesel generators.

generators for electrical requirements in, for example, construction camps. After construction is completed, the operation phase would have a reduced consumption of fuels and increased demand for electricity. Impacts would be related to the construction and operation phase in sequence. Fuel and construction impacts in the short term; electrical impacts in the long term.

Fuel consumption for both equipment and power generation would constitute the major irretrievable resource loss.

The degree of impact would be dependent in many cases on the specific locations of facilities such as power and fuel lines, power facilities, and fuel depots. Most of the power and fuel facility location decisions would not be made without further detailing of the project and consultation between the utility suppliers, the cities, and the Air Force. Therefore only a generalized assessment can be performed at this time.

The impact of demand for petroleum products would be significant. Approximately 42 percent of the projected consumption in 1985 for Nevada/Utah will be the maximum estimated direct and induced diesel requirements for the entire M-X system. From this peak demand during construction, the diesel consumption would be expected to fall to about 11 percent during operation for the entire M-X system including operating bases and support communities. Gasoline usage would similarly rise from about two to six percent of the two-state consumption projections.

Careful siting, taking into account the environmental restrictions, can mitigate the potential impacts of both fuel handling and power facilities. Coordination with the utility companies can assure minimum impact on current electrical power and fuel users and assure that the M-X system becomes operational as planned. Similarly, impacts of fuel availability can be mitigated by timely adjustments of allocations.

Coyote Spring Valley OB Impacts

Potential impacts on the energy resources would be for:

- Fuel: Increased fuel hauling would not create a major impact on the transportation system. The number of haulers would increase without difficulty. Fuel pipelines, depending on their routing, may produce a small to moderate impact. If the pipelines are underground, the impact, except during construction, would be minimal. Fuel storage and handling facilities can be designed to minimize the potential impacts. With adjusted allocations to account for the in-migration of people for M-X jobs the impact on availability and competition for resources can be minimized. In the air quality study reported in the environmental technical report, air pollution impacts from vehicles and equipment have been shown to not be significant.

  At present no petroleum products or natural gas lines extend to the operating base area. The closest natural gas service is about 8 to 10 miles north of Las Vegas. The closest petroleum products pipeline terminates at Las Vegas. There are currently no plans for expansion of these lines. Fuel distributors do not have the capacity to handle the

increases so that either the fuel hauling capabilities would have to be expanded or pipelines constructed.

- *o* Electrical power: New electrical power transmission and distribution facilities would be built. It is anticipated that power for the operating base would be supplied by the H. Allen-Warner Valley Energy System plant at Dry Lake, Nevada scheduled for completion in 1986. The impact of building the new lines and substations is not considered significant. A potential conflict exists between the IPP transmission line routing and the conceptual operating base location.

During the construction most of the energy requirements would be or petroleum products. During operations there would be a major in-migration to the operating base communities with a subsequent increase in the demand for electricity and fuel oil for heating.

Fossil fuel consumption for vehicles, equipment, and power generation constitute the major irretrievable resource loss.

The M-X-induced demand for energy would not produce significant impacts.

Careful siting, taking in account the environmental restrictions and concerns, can mitigate the potential impacts of both fuel and power facilities. Coordination with the utilities can assure minimum impact on current electrical power and fuel users and assure that the M-X defense system becomes operational as planned. Similarly, impacts of fuel availability can be mitigated by timely adjustment of allocations.

Milford OB Impacts

Potential impacts on the energy resources would be similar to those described for Coyote Spring Valley, Nevada; Milford is also without natural gas service. Service could be extended into the area by the Mountain Fuel Supply in Salt Lake City, but there are no such plans at present. Home energy requirements are now supplied by bottled gas, fuel oil, and electricity. Fuel is trucked from Las Vegas and Salt Lake City to regional distribution centers in St. George and Cedar City. Trucking fleets would have to be expanded.

The electrical power supply situation is also similar. New transmission and distribution facilities would be required to serve the operating base and would be constructed by Utah Power & Light. A potential conflict exists between the IPP transmission line routing and the conceptual operating base location.

The foregoing discussions for Coyote Spring Valley, Nevada concerning change over time, irretrievable resource commitments, significance of impacts, and mitigations apply also to Milford.

ALTERNATIVE 1 (4.3.2.10.3)

From an energy impact perspective, Alternative 1 is similar to the Proposed Action except that the operating base 2 impacts would fall on Beryl, Utah rather than on Milford, Utah. Beryl would be affected in the same ways as Milford. Power

to Beryl is supplied by the Dixie-Escalante Rural Electric Association. A potential conflict exists between the IPP transmission line routing and the conceptual operating base location.

ALTERNATIVE 2 (4.3.2.10.4)

From an energy impact perspective, Alternative 2 is similar to the Proposed Action except for some operating base 2 impacts. Delta would be affected in the same general ways as Milford, Utah. Delta is without natural gas service. The nearest supplier is Mountain Fuel Supply in Salt Lake City. There are other proposals, one for a gas transmission line approximately 26 mi east. Electric power is supplied by the Utah Power & Light Company. New power transmission and distribution facilities would be required to operate the M-X system.

ALTERNATIVE 3 (4.3.2.10.5)

From an energy impact perspective, Alternative 3 is also similar to the Proposed Action.

Ely is similar to the other operating base 2 locations. It is without natural gas service, the closest point on the Southwest Base Corporation distribution system is approximately 125 mi north-northwest of Ely in the Elko area. There is a possibility that the Rockey Mountain Pipeline for natural gas may pass near Ely. The fuel energy supplies are trucked in from terminals in Salt Lake City and Las Vegas to the local distribution center. Increase in fuel demands would have to be met by expanding the present truck fleets, by adding new suppliers, or by using military tanker trucks.

New power transmission and distribution facilities would be necessary and would be connected to the IPP generating plant in Utah and the White Pine Power Project generating plant in Nevada.

ALTERNATIVE 4 (4.3.2.10.6)

The energy impacts would be the same as those described for Alternative 1.

ALTERNATIVE 5 (4.3.2.10.7)

The Operating Base 1 energy impacts would be the same as those for Milford in the Proposed Action. The Operating Base 2 impacts would be the same as those for Alternative 3.

ALTERNATIVE 6 (4.3.2.10.8)

The energy impacts would be the same as described for the Proposed Action.

ALTERNATIVE 7 (4.3.2.10.9)

DDA Impacts

Figure 4.3.2.10-4 shows the existing and proposed power transmission lines for the Texas/New Mexico region with an overlay of the M-X system. Figure 4.3.2.10-5

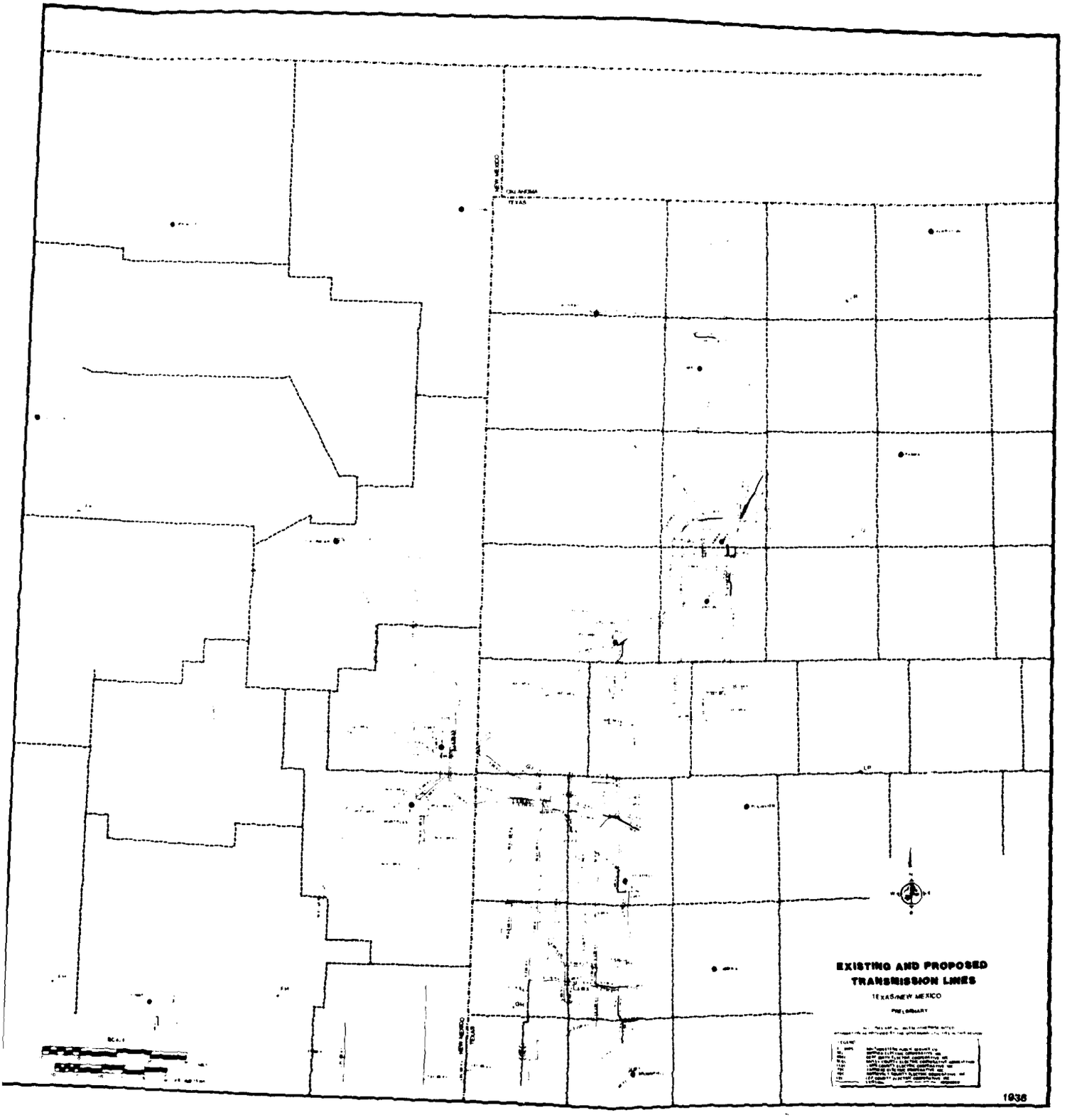


Figure 4.3.2.10-4. Existing and proposed transmission lines in Texas/New Mexico and alternative 7.

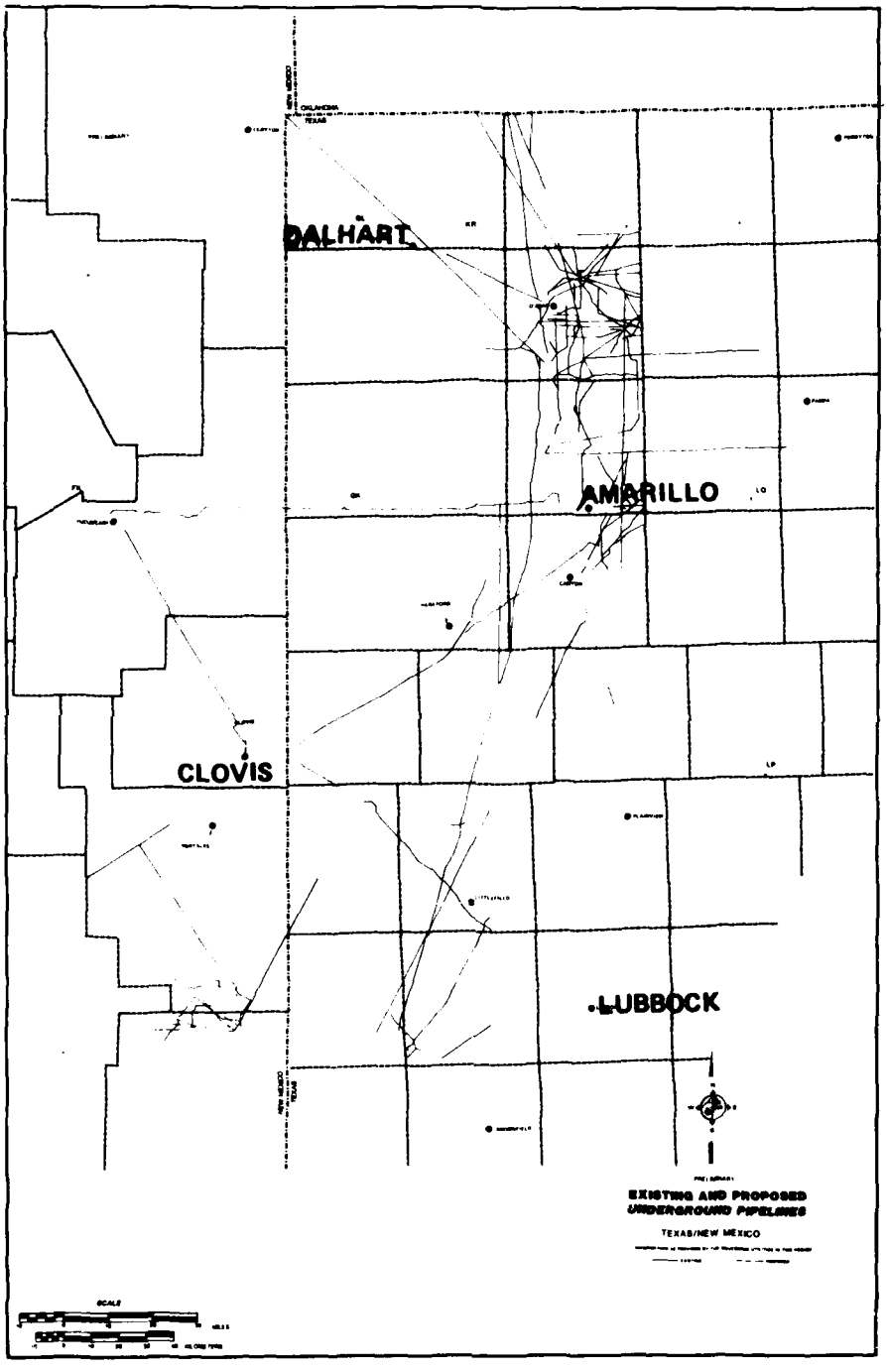


Figure 4.3.2.10-5. Existing and proposed underground pipelines in Texas/New Mexico region.

shows existing and proposed pipelines and indicates the relative abundance of fuel supply lines in the area.

Regionally, the induced effect of the M-X project on the total electrical energy supply is minor, being about one percent of the two-state planned capability (1989). This is less than seven percent of the summer excess available power and about three percent of the winter excess available power. No new generation facilities would be constructed. However, new power transmission and distribution lines would be necessary.

M-X induced demands may produce regional and local impacts on availability of fuels and require adjusting fuel allocations. Air pollution may result from fuel consumption.

Development and utilization of alternative energy systems may favorably impact the energy supply in the region and possibly the nation.

The potential impacts for electrical power would be the same as for the Proposed Action.

The discussion of changes over time and of irretrievable resource commitments for the Proposed Action is also applicable to Alternative 7.

The M-X-induced demand for energy would not produce significant impacts for:

- Fuel: Because of the availability of natural gas and petroleum product pipelines, it is expected that supply of these products will produce only minor impacts. The gasoline consumption for construction and operation for the M-X system and support community is about two percent of the projected 1985 consumption for the two state region. Diesel consumption will be approximately four percent of the projected 1985 consumption for the two state region during the construction phase and about two percent of the projected 1990 consumption for the operations phase. Natural gas consumption would be less than 0.05 percent of the projected 1990 consumption for the two state region.

  Air pollution from fuel combustion is not expected to produce a significant impact.

- Electrical Power: New power transmission and distribution facilities will be added to an area which has a fairly extensive system. With proper preplanning it is not considered that the addition of these facilities would produce a significant impact.

Additional development as a result of new or upgraded power transmission and distribution lines is not expected to occur at a significant level because of the already extensive network in the area.

Burying of power and communications cables is not expected to produce more than a short-term temporary disruptive impact.

Mitigations of energy impacts for the Texas/New Mexico region are the same as described for the Proposed Action.

Clovis, New Mexico OB Impacts

Potential adverse impacts on the energy resource are the same as described for the Texas/New Mexico DDA. Clovis is located in an area served by the Gas Company of New Mexico which could supply the increased natural gas demand without major problems if adequate lead time is allowed to construct required facilities. Petroleum product and crude oil pipelines traverse the Clovis area. Fuel supplies are excellent and no major problems should be encountered.

Electrical power is supplied to Clovis by Southwestern Public Service Company. The additional load can be supplied by upgrading the existing lines or constructing new transmission facilities.

The discussion of change over time and the irretrievable resource commitments for the Proposed Action is also applicable to Alternative 7.

The M-X-induced demand for energy would not produce significant impacts for:

- o Fuel: With timely preplanning of facilities and allocations, the impact on petroleum products and natural gas would be minor.

  Air pollution from increased combustion is not expected to produce a significant impact.

- o Electrical Power: With proper preplanning new power transmission and distribution facilities are not considered to produce a significant impact.

In the vicinity of Clovis it is not expected that the upgrading and addition of power transmission and distribution lines will significantly encourage additional development.

Burying of power and of communication cables is not expected to produce more than a short-term temporary disruptive impact.

Mitigations for the Clovis area are the same as described for the Proposed Action.

Dalhart, Texas OB Impacts

Potential impacts on the energy resources are the same as described for the Texas/New Mexico DDA. Dalhart is located in a major gas producing area. Approximately 75 mi southeast is a large petroleum refining center. Energy supplies are adequate to meet the increased fuel demand.

Electrical power is supplied by Southwestern Public Service Company. New power transmission and distribution facilities will be required to handle the increases in load.

The discussions of changes with time, irretrievable resource commitments, significance of impacts, and mitigations would be the same as those for Clovis, New Mexico.

ALTERNATIVE 8 (4.3.2.10.10)

The discussion of the DDA impacts for the Proposed Action and for Alternative 7 are both applicable to the split basing alternative.

By reducing the size of each area, the impact on energy demand in each area is reduced by about half. The allocation adjustment for fuels would be smaller in each region than for the full systems.

The impacts from constructing and using the operating bases are the same as those for the Proposed Action at Coyote Spring Valley and for Alternative 7 at Clovis.

Land Ownership

LAND OWNERSHIP

INTRODUCTION (4.3.2.11.1)

Three types of land ownership exist in the geotechnically suitable DDA. They are: public land, state land, and private land. In the Nevada/Utah region, public land, administered by the BLM, comprises about 80 percent of the total land. In many cases, the state land is actually owned by the federal government. However, by Congressional grant such lands are administered by the state and revenues from these lands are for the benefit of schools administered by the state. In the Texas/New Mexico region, private land comprises over 80 percent of the study area counties. Community growth induced by this project could require some public land to be converted to private ownership.

In Nevada/Utah, a low percentage of the land required by the project would be private. Because of the importance of private land alternatives have been designed to avoid as much private land as possible. The results to date will be further refined during Tier 2 analyses and decision making.

The tables in this section rate the levels of disturbance on private land. The definitions of the potential impact ratings are found in the footnotes of each table.

This section contains a brief statement for each base describing how an alternate location, within the suitable zone would impact private lands.

PROPOSED ACTION (4.3.2.11.2)

DDA Impacts

Figure 4.3.2.11-1 shows the coincidence of the Proposed Action cluster and DTN layout with private lands. Private lands in the region generally lie in the center of the valleys or along passes where water is most likely to be found. Clusters are often located in the centers of the valleys and the DTN frequently traverses the passes.

Table 4.3.2.11-1 shows valleys that have private land coincident with M-X DDA facilities, the acres of such land that could be disturbed for both construction and operations phases, the percentage of total private land in those valleys that the disturbed land represents, and the level of potential impact of those disturbances for each valley. Of the 17 valleys in which there are private lands coincident with project deployment, 14 have a low impact level, and three have a moderate impact level.

Under the Proposed Action, 1,440 acres of private land would be disturbed by the construction phase, and 895 acres by the operations phase. The difference, 545 acres, could be returned to private use upon completion of the construction phase. The 1,440 acres and the 895 acres are equal to only 0.7 and 0.4 percent respectively of the acres of private land in the Nevada/Utah hydrologic subunits.

Future non-M-X projects such as IPP, WPPP, and Nevada Moly, will also use some privately owned land. The Nevada open pit molybdenum mine in Nye County, will use about 2,900 acres of privately owned grazing land, and is the only projected significant non-M-X use of privately owned land in the region (ABT Associates, Inc., 1979). Because of the permanent nature of the M-X protective structures, it is unlikely that the ground on which they are located would be retrieved for private agricultural use. Roadway systems, however, could be returned to either the original owner's use, or left open to public use with maintenance by local or state jurisdictions.

Impact on private land could be mitigated by assuring that project deployment and operation would not interfere with the use of adjoining private land. Because a maximum of about 1,440 acres of private land would be disturbed (about 1.0 percent of the 150,000 total disturbed acres), it may be possible to avoid privately owned land with minor alterations of the system layout during the Tier Two decision making for specific selection of cluster and road sitings.

Coyote Spring Valley OB Impacts

The site of Coyote Spring operating base is presently public domain, under the administration of the BLM. The base could be accommodated on public land even if the base is relocated within the suitability zone because the nearest private land is about 10 mi north in Lincoln County and about the same distance southeast in Clark County. Figure 4.3.2.11-2 shows the location of the base as Coyote Spring Valley and the private land in the vicinity.

Milford OB Impacts

The site of the operating base near Milford, Utah is mostly under BLM administration, but about 360 acres of private land would be affected. Figure 4.3.2.11-3 shows the location of the base near Milford and the land ownership in the vicinity. If the Milford base were relocated within the suitable zone, it would have to be located on either the northwest or southeast fringe of the zone to avoid privately owned land. Four sections out of every township in the area are state lands, and the central portion of the zone is mostly private land.

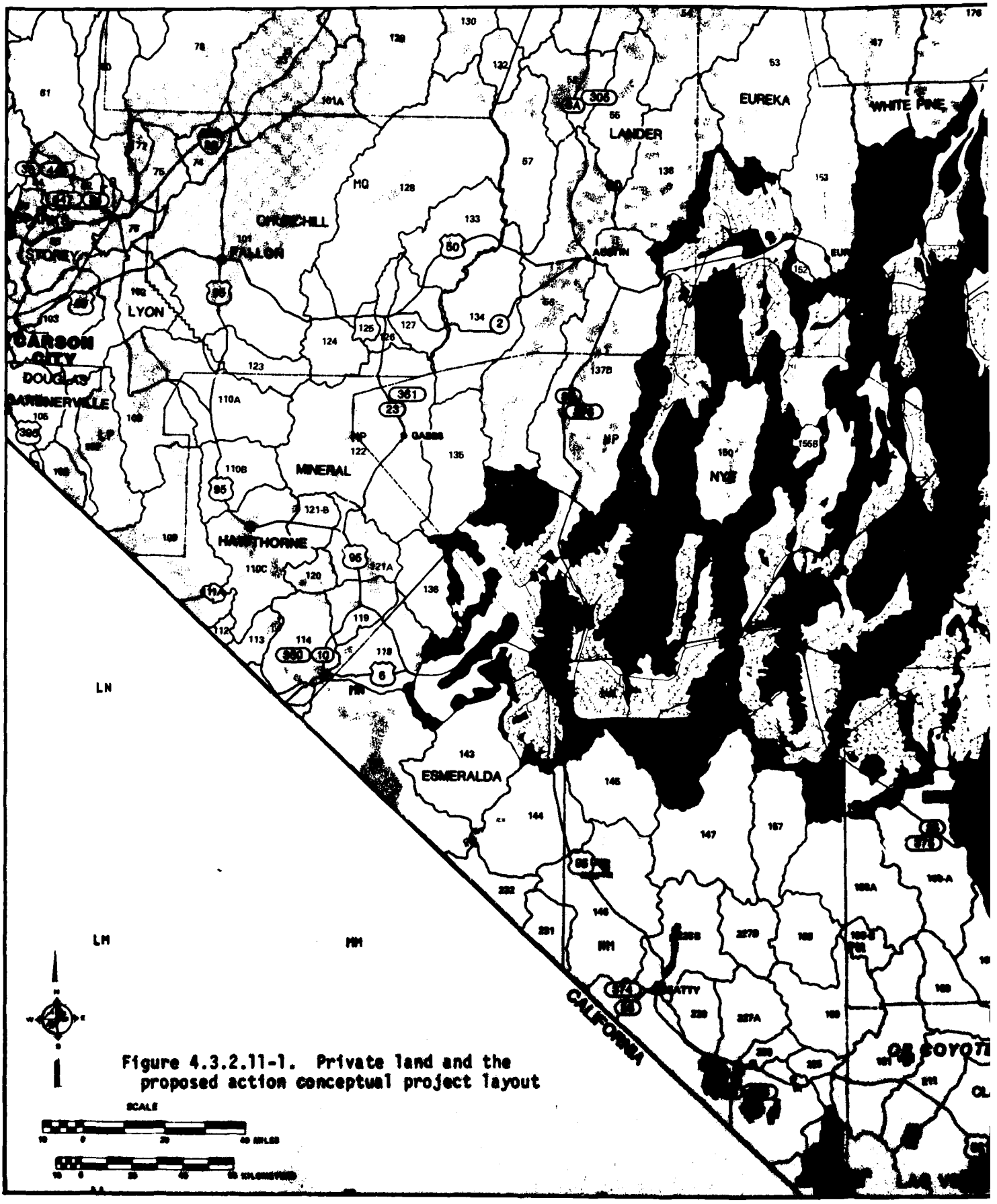
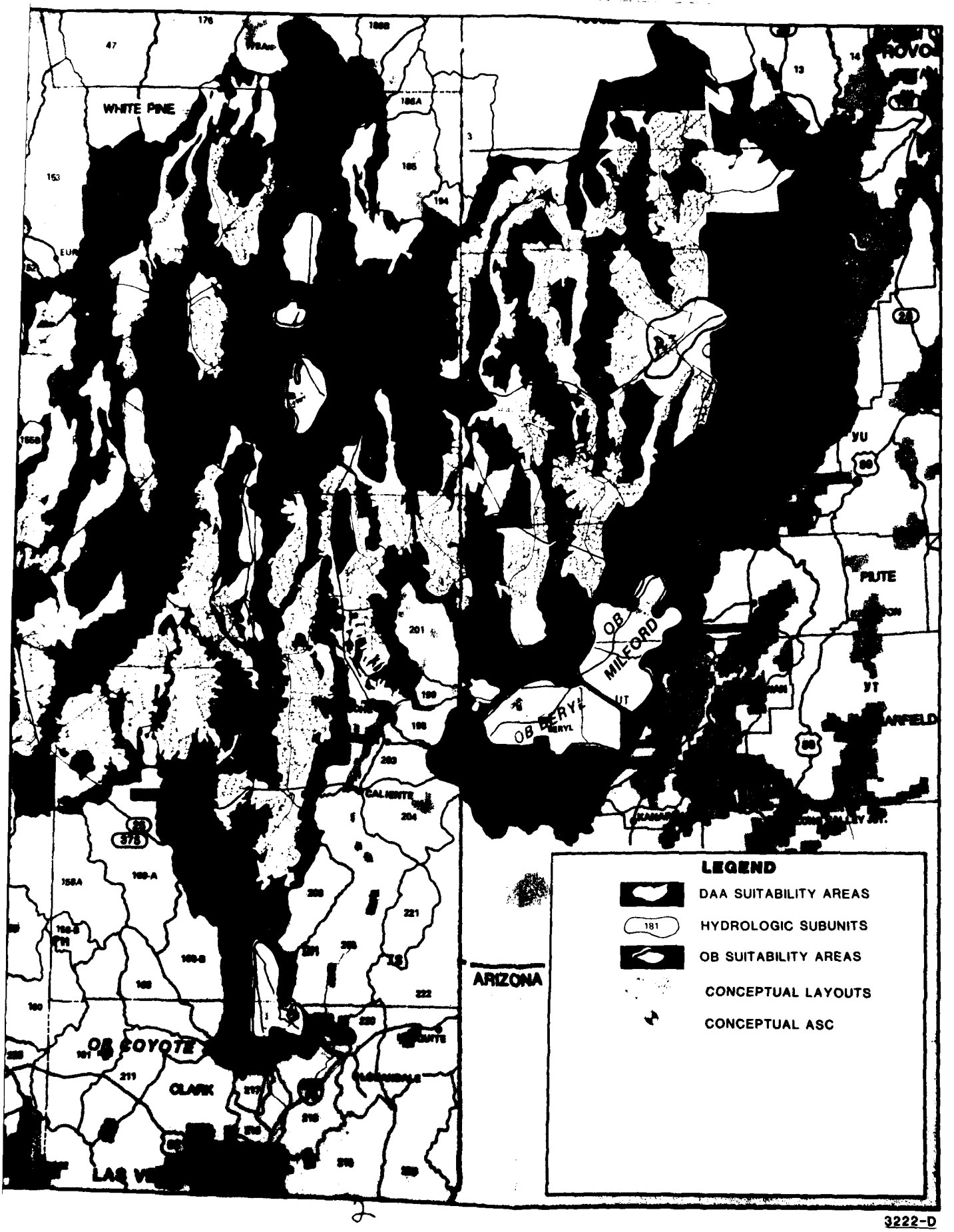


Figure 4.3.2.11-1. Private land and the proposed action conceptual project layout


WHITE PINE
PIUTE
MILFORD
OB
UT
OB BERYL
BERYL
CALIENTE
OB COYOTE
CLARK
ARIZONA
LEGEND
DAA SUITABILITY AREAS
HYDROLOGIC SUBUNITS
181
OB SUITABILITY AREAS
CONCEPTUAL LAYOUTS
CONCEPTUAL ASC

3222-D

Table 4.3.2.11-1. Potential impact on private land in Nevada/Utah DDA for the Proposed Action and Alternatives 1-6.

HYDROLOGIC SUBUNIT		SHORT-TERM EFFECTS			LONG-TERM EFFECTS		
		PRIVATE LAND DISTURBED		POTENTIAL IMPACT[1]	PRIVATE LAND DISTURBED		POTENTIAL IMPACT[1]
NO.	NAME	ACRES	PERCENT OF TOTAL IN HYDRO-SUBUNIT		ACRES	PERCENT OF TOTAL IN HYDRO-SUBUNIT	
	Subunits with M-X Clusters and DTN						
4	Snake	65	0.2		41	0.1	
5	Pine	—	—		—	—	
6	White	—	—		—	—	
7	Fish Springs	—	—		—	—	
8	Dugway	33	0.6		20	0.2	
9	Government Creek	98	0.6		61	0.4	
16	Sevier Desert	—	—		—	—	
46A	Sevier Desert & Dry Lake[2]	—	—		—	—	
54	Wah Wah	164	1.3		102	0.8	
137A	Big Smoky-Tonopah Flat	229	2.8		143	1.7	
139	Kobeh	131	1.3		82	0.8	
140A	Monitor—Northern	65	1.7		41	1.1	
140B	Monitor—Southern	—	—				
141	Ralston	98	1.1		61	0.7	
142	Alkali Spring	—	—		—	—	
148	Cactus Flat	—	—		—	—	
149	Stone Cabin[2]	33	1.1		20	0.7	
151	Antelope	98	1.0		61	0.6	
154	Newark[2]	—	—		—	—	
155A	Little Smoky—Northern	33	0.5		20	0.3	
155C	Little Smoky—Southern	—	—		—	—	
156	Hot Creek	33	0.9		20	0.5	
170	Penoyer	—	—		—	—	
171	Coal	33	3.3		20	0.2	
172	Garden	—	—		—	—	
173A	Railroad—Southern	—	—		—	—	
173B	Railroad—Northern	65	0.3		41	0.2	
174	Jakes[2]	33	1.3		20	0.8	
175	Long	—	—		—	—	
178B	Butte—South	—	—		—	—	
179	Steptoe	—	—		—	—	
180	Cave	33	0.1		20	0.1	
181	Dry Lake[2]	—	—		—	—	
182	Delamar	—	—		—	—	
183	Lake	—	—		—	—	
184	Spring	—	—		—	—	
196	Hamlin	—	—		—	—	
202	Patterson	—	—		—	—	
207	White River	98	0.3		61	0.2	
208	Pahroc	—	—		—	—	
209	Pahranagat	98	3.1		61	1.9	
	Overall DDA	1,440	0.7		895	0.4	

3876-3

[1]

No impact. (No private land disturbed.)

Low to moderately low impact. (Less than 100 acres or less than 1 percent of private land disturbed in subunit.)

Moderate to moderately high impact. (Less than 1,000 acres or less than 3 percent of private land disturbed in subunit.)

High impact. (More than 1,000 acres or more than 3 percent of private land disturbed in subunit.)

[2]Conceptual location of Area Support Centers (ASCs).

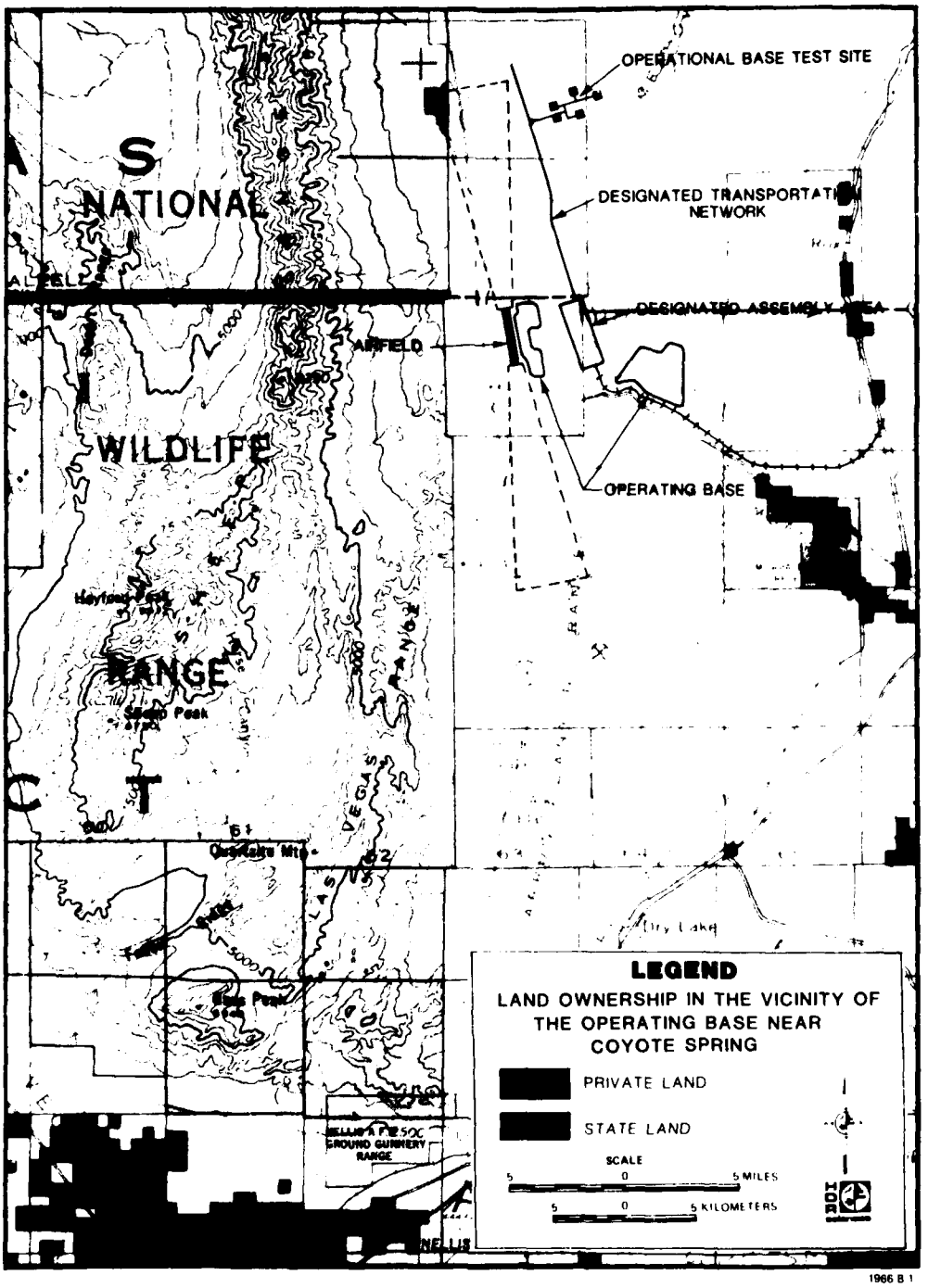


Figure 4.3.2.11-2. Land ownership in the vicinity of the Coyote Spring operating base.

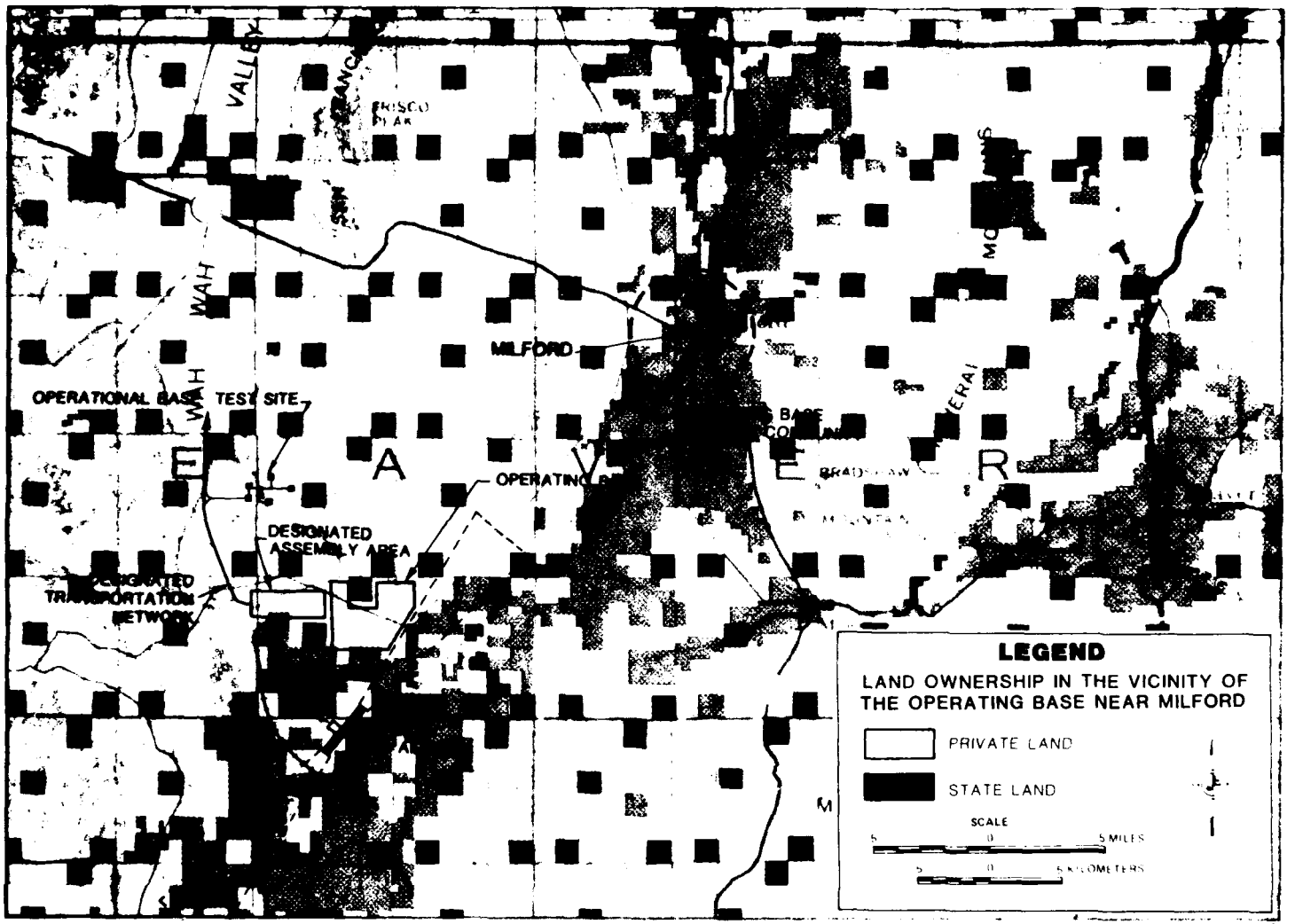


Figure 4.3.2.11-3. Land ownership in the vicinity of the operating base near Milford, Utah.

ALTERNATIVE 1 (4.3.2.11.3)

The cluster layout for Alternative 1 is the same as for the Proposed Action, and the DDA impacts on private land would be the same.

The two operating bases for this alternative would be located in Coyote Spring Valley, Nevada and near Beryl, Utah. The present ownership of the site at Coyote Spring is public domain under BLM administration.

Figure 4.3.2.11-4 shows the location of the proposed base near Beryl, and the land ownership in the area. If the Beryl base were relocated within the suitable zone it would probably coincide with private land. Most of the zone is privately owned, with public land found only in the foothills on the north, and in the valley in the extreme east. About 3,200 acres of the 8,340 acre potential Beryl base would be in private ownership as presently proposed.

ALTERNATIVE 2 (4.3.2.11.4)

The cluster layout and impacts for Alternative are is the same as for the Proposed Action.

The two operating bases for this alternative would be located in Coyote Spring Valley, Nevada and near Delta, Utah. The present ownership of the site at Coyote Spring and Delta is public domain and at Delta it is under both public and state administration.

Figure 4.3.2.11-5 shows the location of the proposed base near Delta and the land ownership in the area. If the Delta base were carefully located within the suitable zone, it could be placed on public domain. State lands occupy four sections out of every township and private land is found in the northwest part of the zone near the town of Delta.

ALTERNATIVE 3 (4.3.2.11.5)

The cluster layout for Alternative 3 is the same as for the Proposed Action.

The two operating bases for this alternative would be located near Beryl, Utah and near Ely, Nevada. The present status of the site Beryl is discussed in the Proposed Action.

Figure 4.3.2.11-6 shows the location of the proposed base near Ely, and the land ownership in the area. If the Ely base were relocated within the suitable zone it could be established on BLM land. Movement to other areas, especially in the northerly portions of the zone along Duck Creek, would require the use of private land. As presently conceived, the Beryl site would use about 1,300 acres of private land.

ALTERNATIVE 4 (4.3.2.11.6)

The cluster layout for Alternative 4 is the same as for the Proposed Action and the Coyote Spring Valley and Beryl operating bases discussed in the Proposed Action.

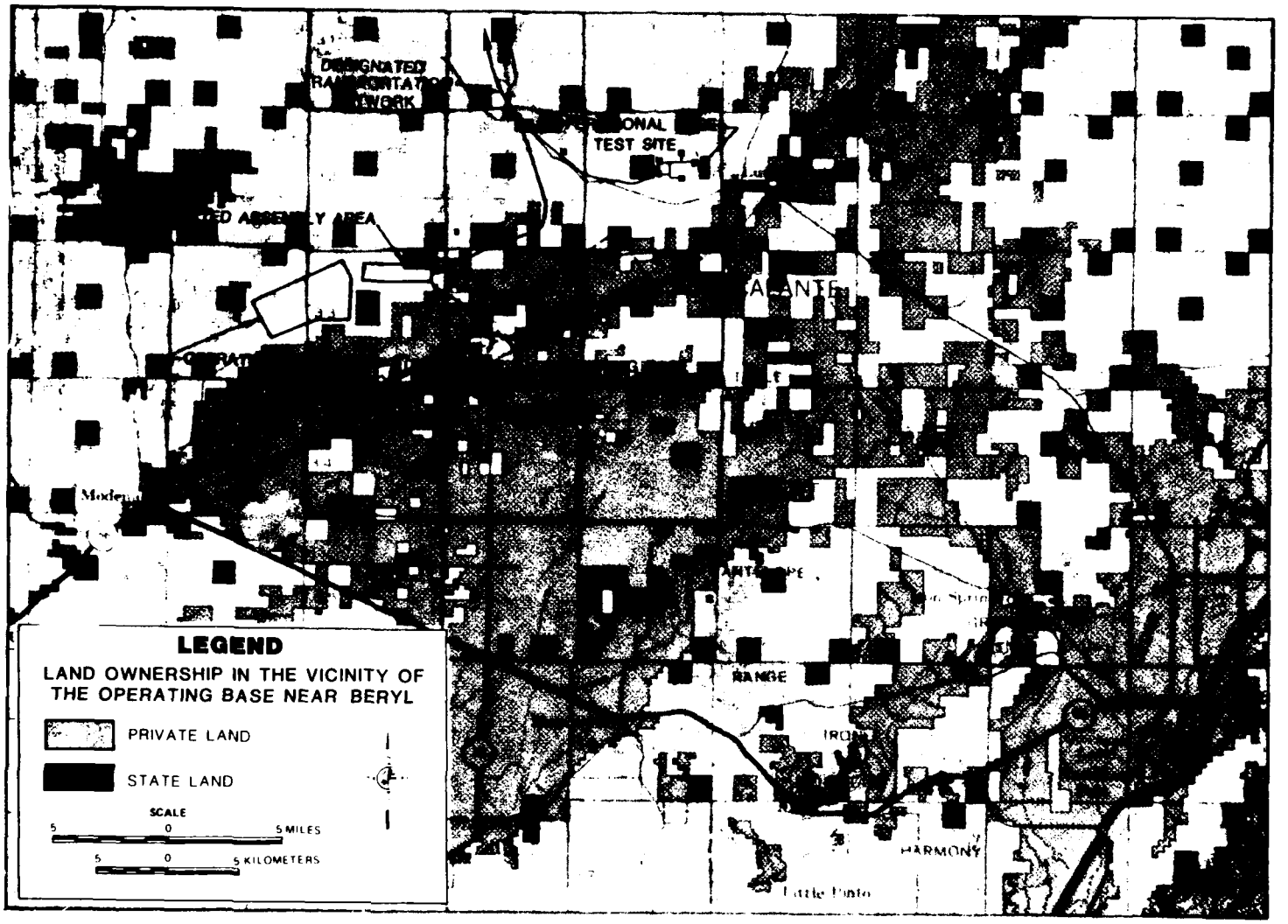


Figure 4.3.2.11-4. Land ownership in the vicinity of the operating base at Beryl, Utah.

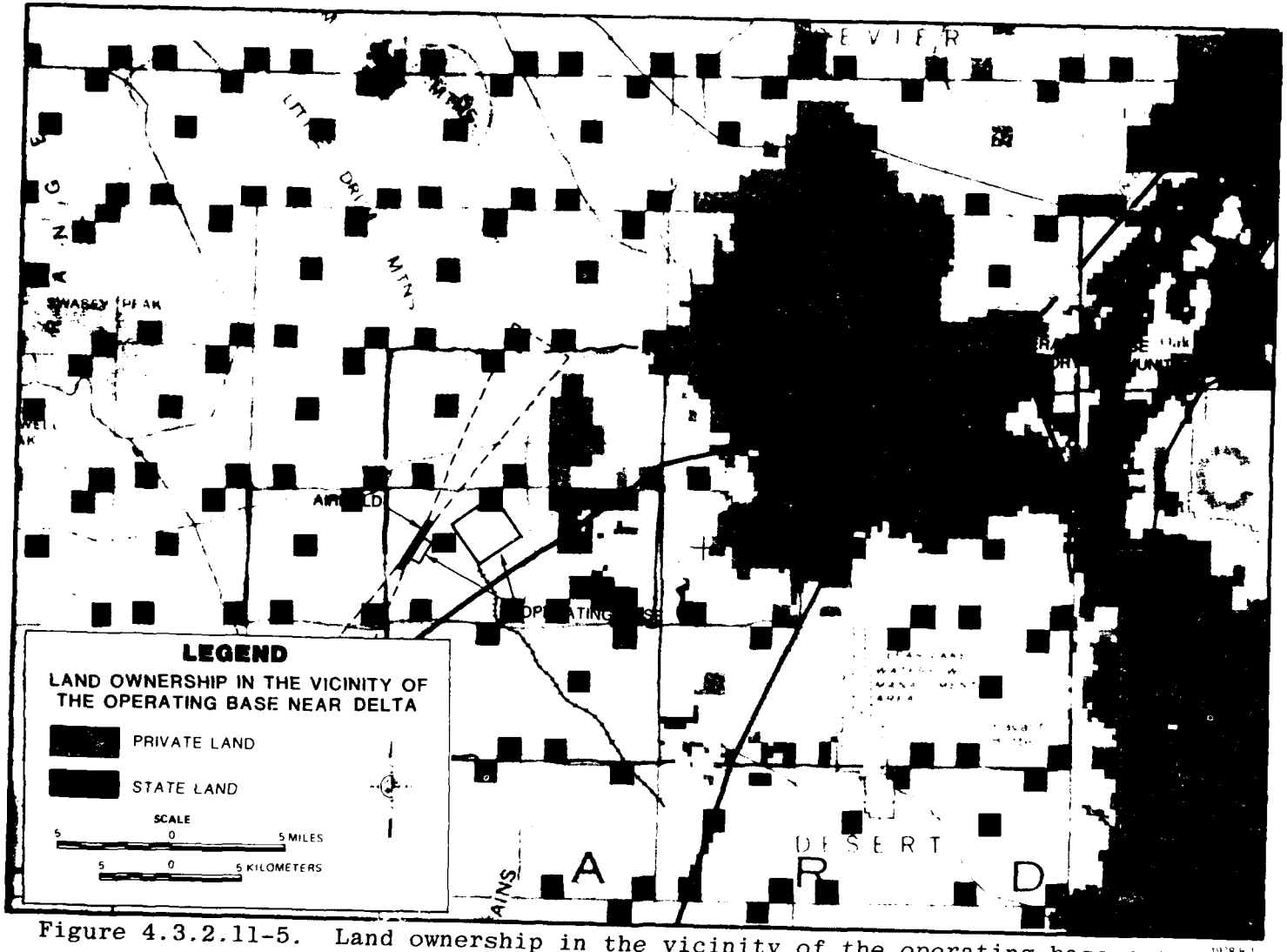


Figure 4.3.2.11-5. Land ownership in the vicinity of the operating base near Delta, Utah.

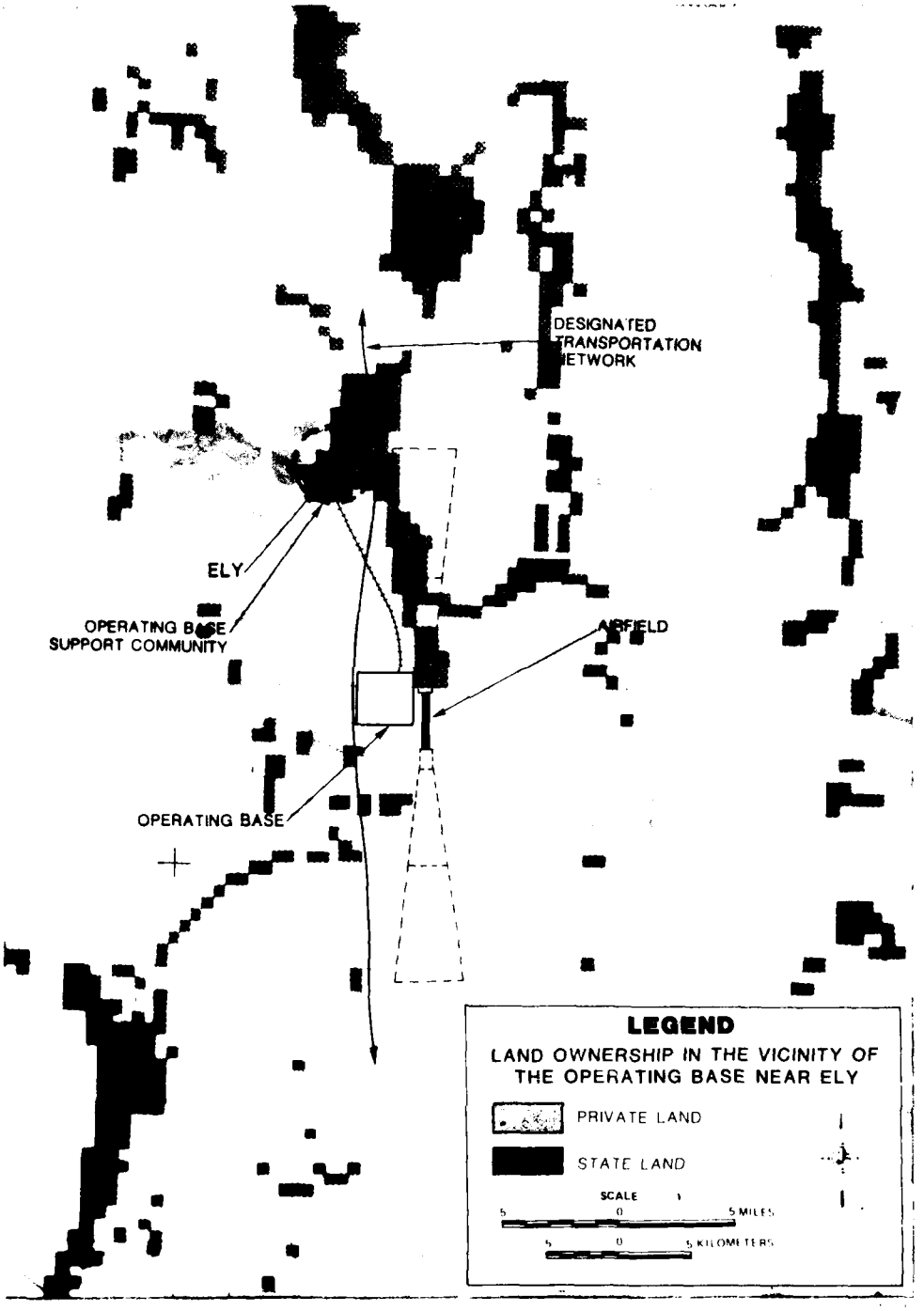


Figure 4.3.2.11-6. Land ownership in the vicinity of the operating base near Ely, Nevada.

ALTERNATIVE 5 (4.3.2.11.7)

The DDA impacts on private land would be the same as for the Proposed Action. The two operating bases for this alternative would be located near Milford, Utah and near Ely, Nevada.

ALTERNATIVE 6 (4.3.2.11.8)

The impacts upon DDA and OB land ownership for this alternative are similar to those for the Proposed Action. The OBs for this alternative would be Milford and Coyote Spring.

ALTERNATIVE 7 (4.3.2.11.9)

DDA Impacts

Two hundred clusters of 23 protective shelters each would be deployed in the Texas/New Mexico region under Alternative 7. Figure 4.3.2.11-7 shows the coincidence of private lands and project activity. Private lands dominate in the Texas counties, and in the New Mexico counties.

Table 4.3.2.11-2 shows the counties in the Texas/New Mexico study area, the acres of private land that could be disturbed for both construction and operations phases, the percentage of the total private land in those counties that the disturbed land represents, and the level of impact of those disturbances for each county.

It can be seen that for the construction phase, of the 21 counties in which there are private lands coincident with project deployment, none would have a low potential impact, one (Hockley) would have a moderate impact, and all of the others would have a high potential impact. Alternative 7 would have high absolute impacts of 146,680 acres of private land disturbed during the construction phase, and 91,507 acres during operations. Thus, there will be localized high impacts, but regionally the effects will not be significant; 55,173 acres could be returned to private use upon completion of the construction phase. The 146,680 acres and the 91,507 acres are equal to 0.70 and 0.43 percent respectively, of the 21 million acres of private land in the Texas/New Mexico region.

Future non-M-X projects such as the Tolk Power Plants, Highway I-27, and the CO_2 pipelines will not use significant amounts of privately owned land. Because of the permanent nature of the M-X structures, it is unlikely the ground on which they are located would be retrieved for agriculture. Roadway systems, however, could be left open to the public with maintenance by local or state jurisdictions. Return to private ownership would be in accordance with established procedures.

The impact on private land could be mitigated by assuring that project deployment and operation would not interfere with the use of adjoining private land. Under Alternative 7, an estimated 146,680 acres of private land would be disturbed (about 98 percent of the potential 150,000 total disturbed acres). It would not be possible to avoid privately owned land in the Texas/New Mexico region.

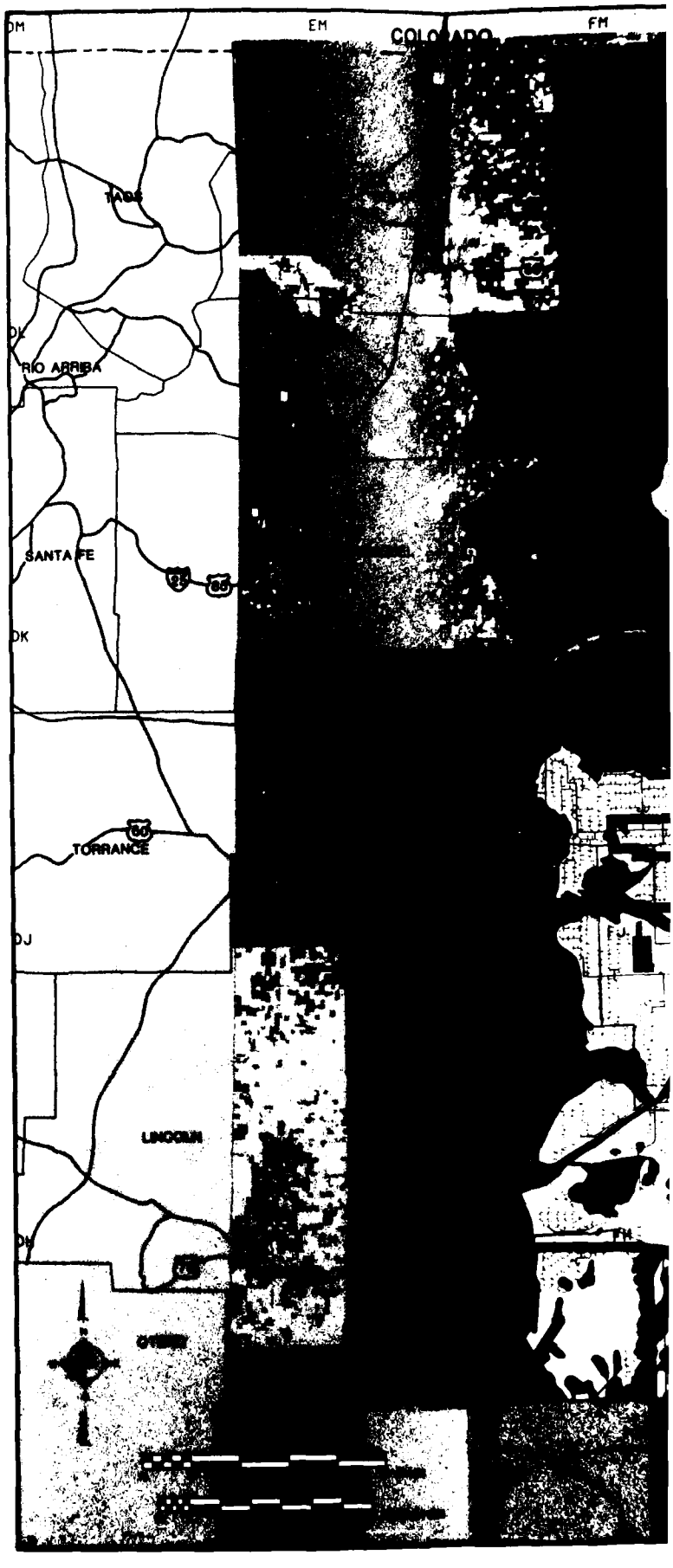
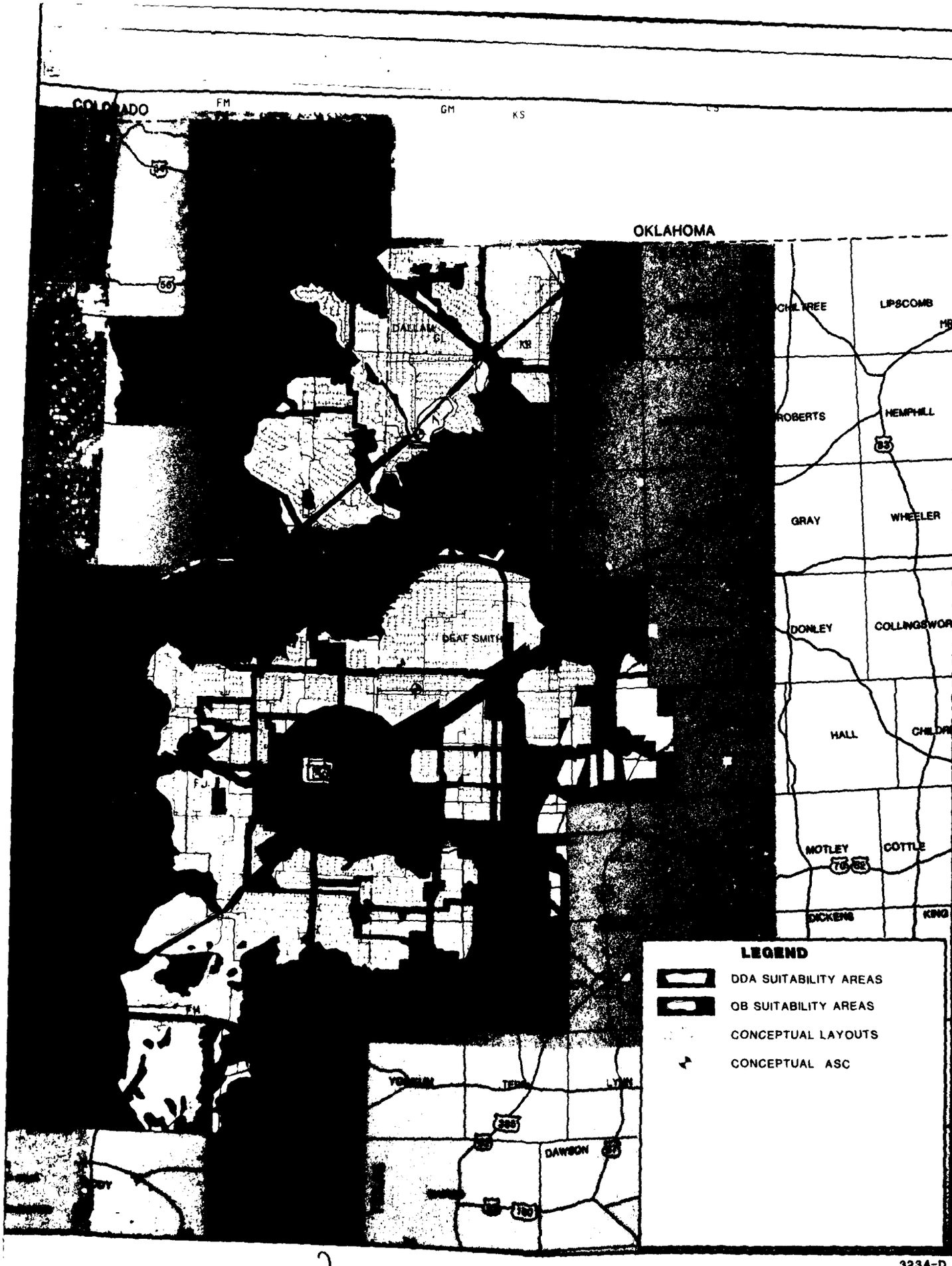


Figure 4.3.2.11-7. Private land and alternative 7.


COLORADO
OKLAHOMA
DALLAM
DEAF SMITH
CHILDRESS
LIPSCOMB
ROBERTS
HEMPHILL
GRAY
WHEELER
DONLEY
COLLINGSWORTH
HALL
CHILDRESS
MOTLEY
COTTLE
DICKENS
KING
DAWSON
LYNN
LEGEND
DDA SUITABILITY AREAS
OB SUITABILITY AREAS
CONCEPTUAL LAYOUTS
CONCEPTUAL ASC

2

3234-D

Table 4.3.2.11-2. Potential impact to private land in the Texas/New Mexico DDA for Alternative 7.

COUNTY	SHORT-TERM EFFECTS			LONG-TERM EFFECTS		
	PRIVATE LAND DISTURBED		POTENTIAL IMPACT[1]	PRIVATE LAND DISTURBED		POTENTIAL IMPACT[1]
	ACRES	PERCENT OF TOTAL IN COUNTY		ACRES	PERCENT OF TOTAL IN COUNTY	
Counties with M-X Clusters and DTN						
Bailey, TX	4,301	0.6		2,122	0.4	
Castro, TX	4,611	0.8		2,877	0.5	
Cochran, TX	2,322	6.5		1,449	0.3	
Dallam, TX	19,653	2.2		12,261	1.4	
Deaf Smith, TX[2]	23,675	3.2		14,770	2.0	
Hartley, TX[2]	12,720	1.3		7,935	0.8	
Hockley, TX	752	0.1		469	0.1	
Lamb, TX	1,570	0.2		979	0.1	
Oldham, TX	2,420	0.3		1,510	0.2	
Parmer, TX	7,031	0.1		4,386	0.8	
Randall, TX	2,158	0.4		1,346	0.2	
Sherman, TX	1,210	0.2		755	0.1	
Swisher, TX	1,537	0.3		959	0.2	
Chaves, NM	13,898	0.7		8,670	0.5	
Curry, NM	4,208	0.7		3,873	0.7	
DeBaca, NM	2,965	0.3		1,850	0.2	
Guadalupe, NM	—	—		—	—	
Harding, NM	6,794	0.7		4,238	0.4	
Lea, NM	2,285	0.2		1,426	0.1	
Quay, NM	7,165	0.4		4,470	0.3	
Roosevelt, NM[2]	18,283	1.4		11,406	0.9	
Union, NM	6,022	0.3		3,757	0.2	
Overall DDA	146,680	0.7		91,507	0.4	

3877-2

No impact. (No private land disturbed.)

Low impact. (Less than 100 acres or less than 1 percent of private land disturbed in subunit.)

Moderate impact. (Less than 1,000 acres or less than 3 percent of private land disturbed in subunit.)

High impact. (More than 1,000 acres or more than 3 percent of private land disturbed in subunit.)

[2]Conceptual location of Area Support Centers (ASCs).

Clovis OB Impacts

The operating base adjoining Cannon AFB west of Clovis, New Mexico, would be located entirely on what is now privately owned land. It would occupy about 8,300 acres, or one percent of the private land in Curry County where Cannon AFB is located. This impact is not considered significant. Figure 4.3.2.11-8 shows the location of the base near Clovis and land ownership in the vicinity.

Dalhart OB Impacts

The base site 10 mi southwest of Dalhart would require about 6,200 acres of private land which is equal to about 0.6 percent of the private land in Hartley County where it would be located. This impact is also not considered to be significant. Figure 4.3.2.11-9 shows the suitability zone for location of the proposed base near Dalhart and the land ownership in the vicinity.

If either the base near Clovis or Dalhart were relocated within the suitable zone, private land would still have to be used. Two sections of land out of every township in the New Mexico area are state lands. There is also a possibility that state lands could be used in lieu of private lands by moving the Dalhart base 2 mi west.

The project impact on private land could be mitigated by assuring the base is operated in a manner that would not interfere with the use of adjoining lands. This would include such things as noise and dust supression, flood and drainage control, and the control of litter and waste.

ALTERNATIVE 8 (4.3.2.11.10)

DDA Impacts

Alternative 8 is a split basing system with 70 clusters in Nevada, 30 in Utah, 35 in Texas, and 65 in New Mexico. The deployment system for the Nevada/Utah region is shown on Figure 4.3.2.11-10 together with cluster coincidence with private lands. Figure 4.3.2.11-11 shows this information for the Texas/New Mexico portion of Alternative 8.

The permanent nature of the structures make it unlikely that the ground they occupy could be retrieved for agricultural use, unless they were removed and the earth restored. The roadway systems would be left open to the public.

The impact of the project upon adjoining private land could be mitigated by assuring that project deployment would not interfere with irrigation systems, access roads to farmlands or natural drainage areas. Additional private lands in Nevada/Utah could be avoided with Tier 2 refinement. In Texas/New Mexico, however, this would not be possible.

Nevada/Utah

Table 4.3.2.11-3 shows the valleys in the Nevada/Utah study area which have proposed clusters which coincide with private land for Alternative 8, the number of acres of private land that would be disturbed by both the construction phase and

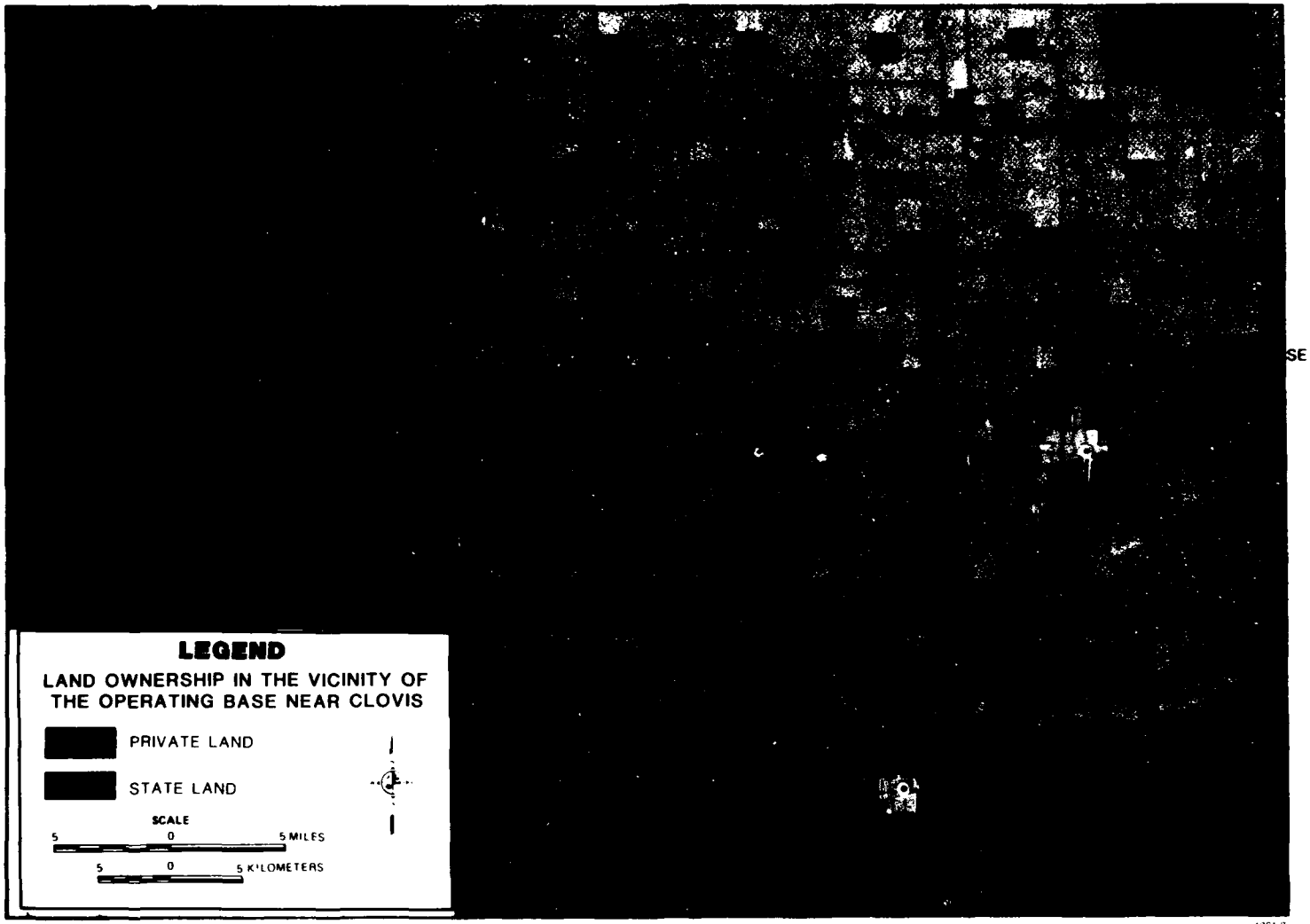


Figure 4.3.2.11-8. Land ownership in the vicinity of the operating base near Clovis, New Mexico

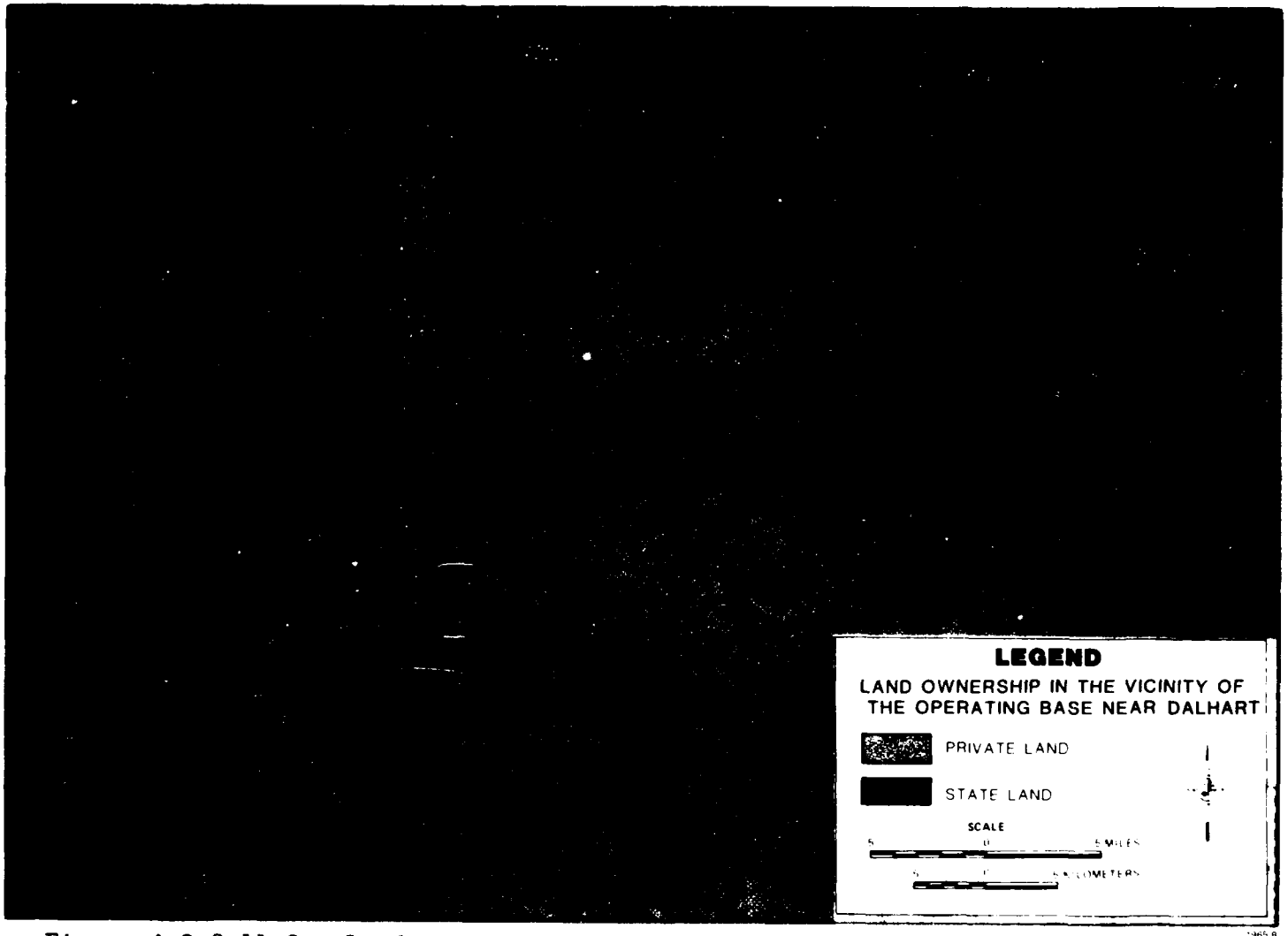


Figure 4.3.2.11-9. Land ownership in the vicinity of the operating base near Dalhart, Texas.

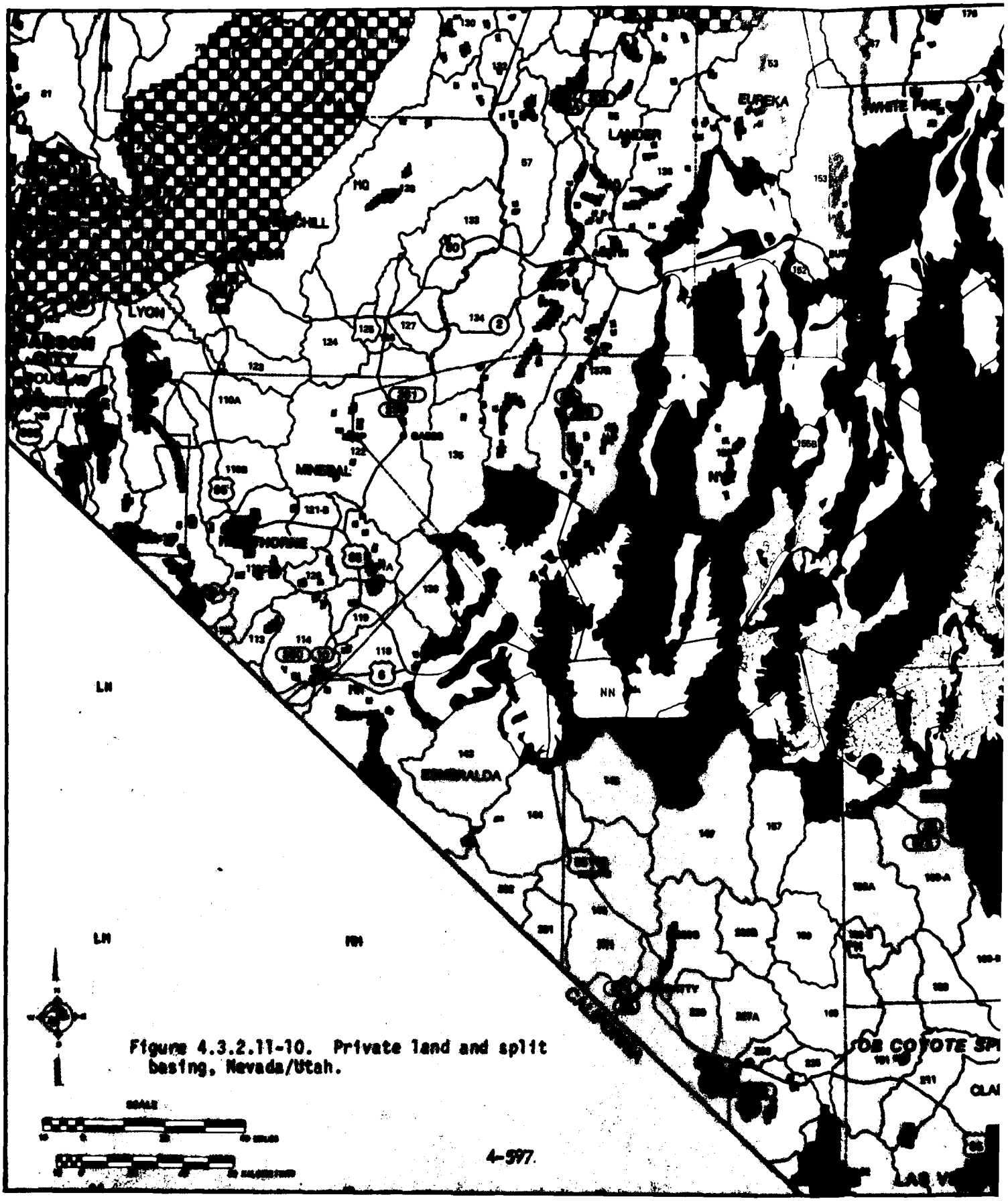
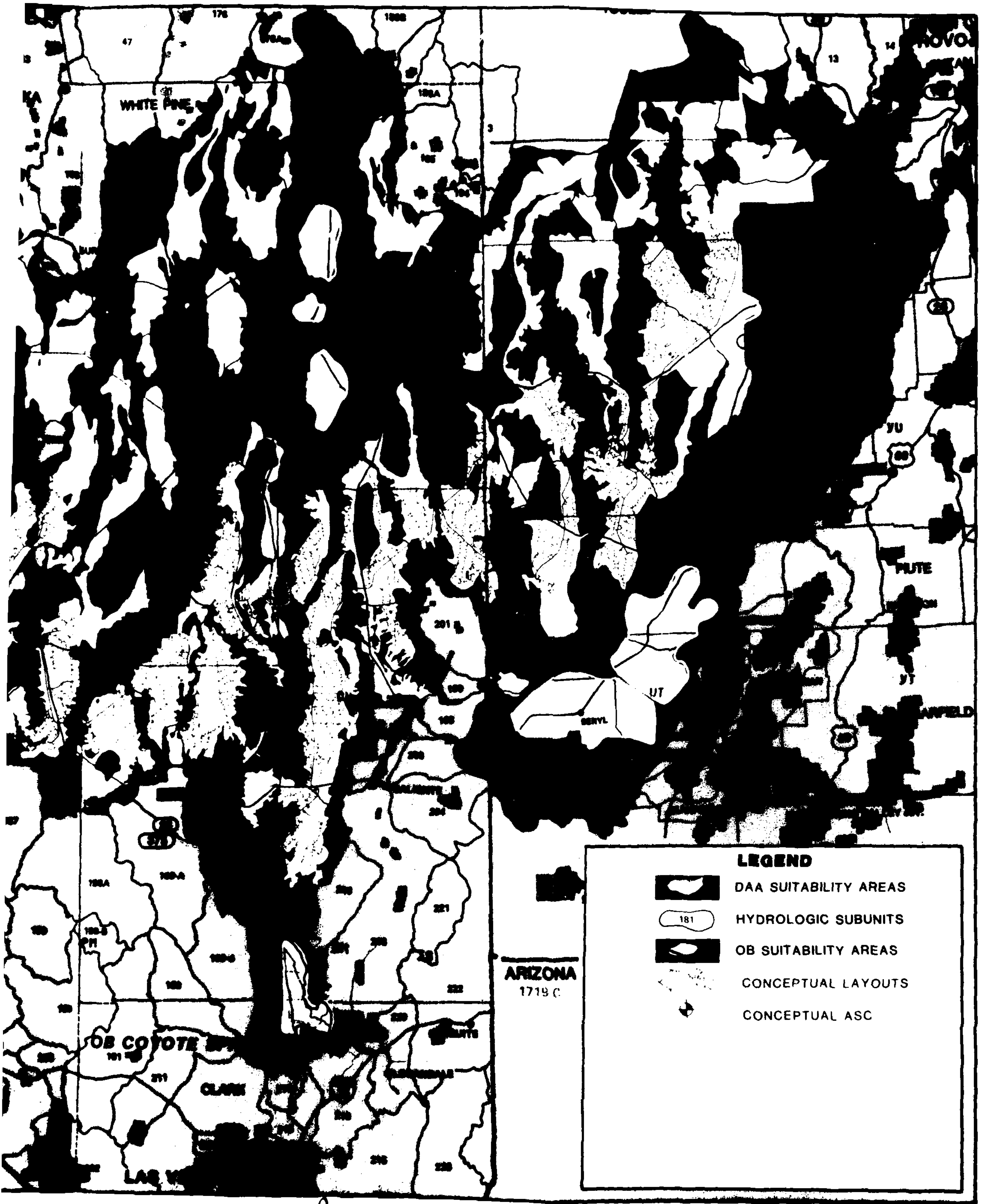


Figure 4.3.2.11-10. Private land and split basing, Nevada/Utah.


WHITE PINE
47
13
14
UT
BERYL
PIUTE
ARIZONA
1719 C
CLARK
LEGEND
DAA SUITABILITY AREAS
181
HYDROLOGIC SUBUNITS
OB SUITABILITY AREAS
CONCEPTUAL LAYOUTS
CONCEPTUAL ASC

3222-D

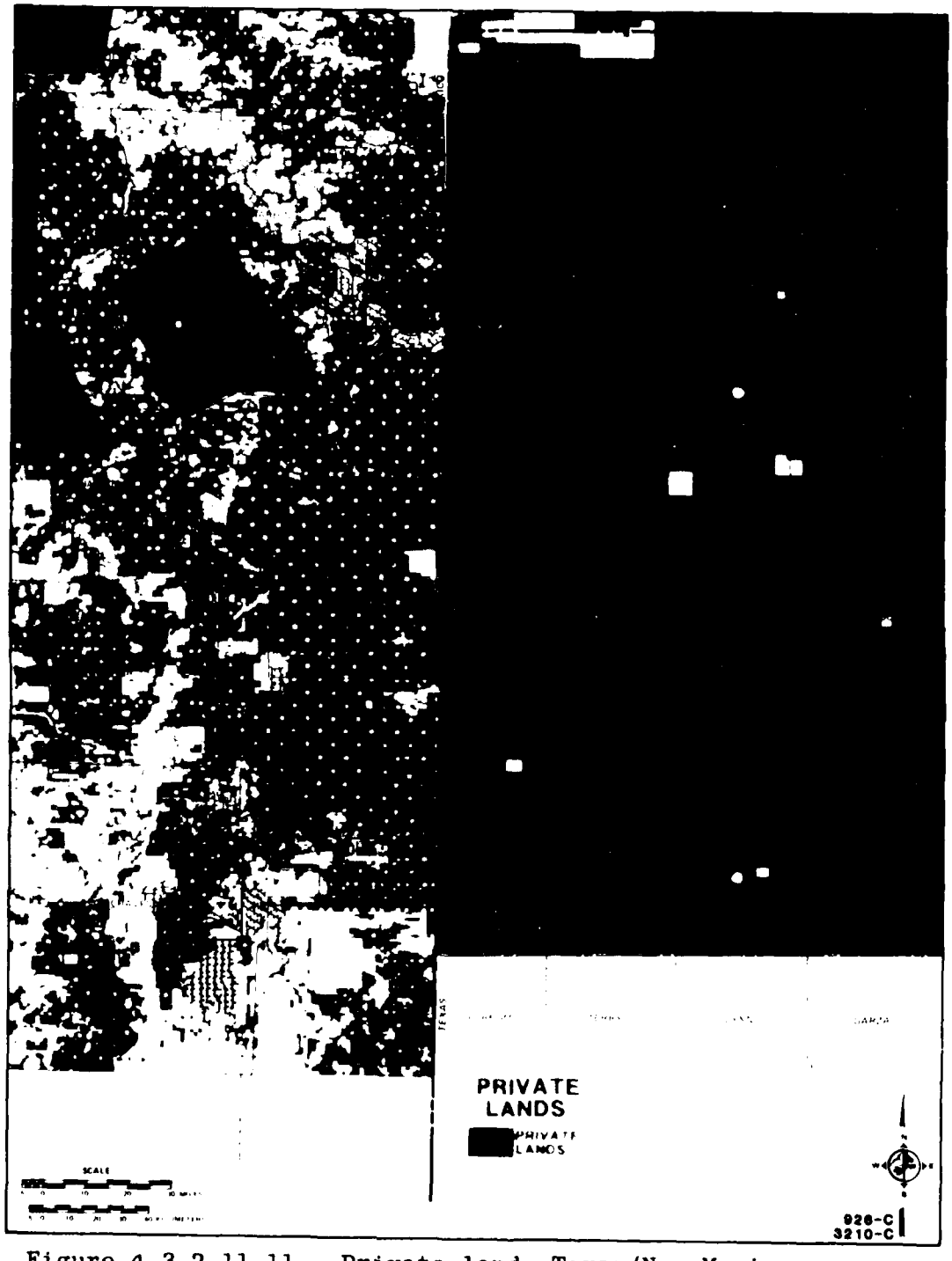


Figure 4.3.2.11-11. Private land, Texas/New Mexico, and Alternative 8.

Table 4.3.2.11-3. Potential impact on private land in Nevada/Utah and Texas/New Mexico DDAs for Alternative 8.

HYDROLOGIC SUBUNIT OR COUNTY		SHORT-TERM EFFECTS			LONG-TERM EFFECTS		
		PRIVATE LAND DISTURBED		POTENTIAL IMPACT[1]	PRIVATE LAND DISTURBED		POTENTIAL IMPACT[1]
NO.	NAME	ACRES	PERCENT OF TOTAL IN SUBUNIT OR COUNTY		ACRES	PERCENT OF TOTAL IN SUBUNIT OR COUNTY	
	Subunits and Counties with M-X Clusters and DTN						
4	Snake	—	—		—	—	
5	Pine	—	—		—	—	
6	White	—	—		—	—	
7	Fish Springs	—	—		—	—	
46	Sevier Desert	—	—		—	—	
46A	Sevier Desert & Dry Lake[2]	—	—		—	—	
54	Wah Wah	164	1.3		102	0.8	
155C	Little Smoky—Southern	—	—		—	—	
156	Hot Creek	33	0.9		20	0.5	
170	Penoyer	—	—		—	—	
171	Coal	33	3.3		20	0.2	
172	Garden	—	—		—	—	
173A	Railroad—Southern	—	—		—	—	
173B	Railroad—Northern	—	—		—	—	
180	Cave	—	—		—	—	
181	Dry Lake[2]	—	—		—	—	
182	Delamar	—	—		—	—	
183	Lake	—	—		—	—	
184	Spring	—	—		—	—	
196	Hamlin	33	0.1		20	0.1	
202	Patterson	—	—		—	—	
207	White River	98	0.3		61	0.2	
208	Pahroc	—	—		—	—	
209	Pahranagat	98	3.1		61	1.9	
	Bailey, TX	458	0.1		286	0.06	
	Cochran, TX	1,537	0.3		959	0.2	
	Dallam, TX	6,442	0.7		4,019	0.5	
	Deaf Smith, TX	8,175	1.1		5,110	0.7	
	Hartley, TX[2]	7,619	0.8		4,753	0.5	
	Hockley, TX	458	0.1		286	0.5	
	Lamb, TX	294	0.04		183	0.03	
	Oldham, TX	1,341	0.14		837	0.09	
	Parmer, TX	—	—		—	—	
	Chaves, NM	14,423	0.8		8,998	0.5	
	Curry, NM	1,297	0.2		809	0.1	
	DeBaca, NM	2,347	0.2		1,465	0.1	
	Guadalupe, NM	—	—		—	—	
	Harding, NM	6,547	0.7		4,085	0.4	
	Lea, NM	525	0.04		328	0.02	
	Quay, NM	9,852	0.6		6,146	0.4	
	Roosevelt, NM[2]	6,208	0.5		3,873	0.3	
	Union, NM	4,972	0.3		3,102	0.2	
	Overall Nevada/ Utah DDA	459	0.6		284	0.3	
	Overall Texas/ New Mexico DDA	72,459	0.36		46,920	0.2	
	Overall Alternatives	72,918	—		47,204	—	

3878-2

None. (No private land disturbed.)

Low to moderately low impact. (Less than 100 acres or less than 1 percent of private land disturbed in subunit.

Moderate to moderately high impact. (Less than 1,000 acres or less than 3 percent of private land disturbed in subunit.)

High impact. (More than 1,000 acres or more than 3 percent of private land disturbed in subunit.)

[2]Conceptual location of Area Support Centers (ASCs).

operations phase, the percentage of total private land in those valleys the disturbed land represents, and the level of significance of those disturbances for each valley. Of the six valleys in which private lands coincide with project deployment, five have a low significance level, and one has a moderate significance level.

The construction phase could disturb 459 acres of private land and 284 acres by the operations phase. These acreages represent 0.008 percent and 0.005 percent, respectively, of the 5,756,100 acres of privately owned land in the Nevada/Utah study area counties (Dept. of Commerce, 1979) and 0.6 and 0.3 percent respectively of the private land in the affected counties. The difference between the acreage disturbed for construction and for operations is 175 acres of private land, which could be returned to private use upon completion of the construction phase.

The future non-M-X project which would have the most significant impact on private land would be Nevada Moly, with 2,900 acres. Population growth resulting from the project could result in the use of undeveloped private land.

Texas/New Mexico

Table 4.3.2.11-3 shows the study area counties in the Texas/New Mexico region, the number of acres of private land in each county, the number of acres of such land that would be disturbed by the Alternative 8 conceptual layout for both construction and operations phases of the project, the percentage of the total private land in the counties that the disturbed land represents, and the level of significance of those disturbances for each county. Of the 23 study area counties, seven have no direct impacts. Four would have an impact significance level of 2 (moderately low), five have a significance level of 3 (moderate), six would have a significance level of 4 (moderately high), and one would have a significance level of 5 (high). The total acreage is lower than that impacted under Alternative 7, but in specific counties the impact is essentially unchanged.

Construction could disturb 72,459 acres of private land and operations, 46,920 acres. These acreages represent 0.36 percent and 0.22 percent, respectively, of the 21,048,000 acres of private land in the Texas/New Mexico study area counties (Dept. of Commerce, 1979). The difference between the construction acreage disturbed and the operations acreage disturbed is 25,539 acres. This area could be returned to private use after the completion of construction.

Future non-M-X projects such as the Tolk power plants, Highway I-27, and the CO_2 pipelines are not expected to use significant amounts of private lands.

Operating Base Impacts

The land at the operating base site in Coyote Spring Valley is public domain, and no private land would be impacted by the project. The second operating base is located near Clovis, New Mexico, and is entirely private land.

STATE LANDS

Nevada/Utah Region

All of the state lands that would be disturbed in this region by M-X are in Utah, where 3, 890 acres or 0.6 percent of the state lands in the study area valleys

would be disturbed by the construction phase. The operations phase would disturb about 60 percent of this amount. Either the Air Force would pay Utah for use of the land, and the monies would go to education, or land trades would have to be negotiated.

Texas/New Mexico Region

All of the state lands that would be disturbed in this region by M-X are located in New Mexico, where 17,720 acres or 0.5 percent of the state lands in the study area counties. The maximum use of state lands would be in Harding County where 3,041 acres or 0.9 percent of that county's state land would be disturbed. As in Utah, either the Air Force would pay for use of these lands or land trades would be negotiated.

Operating Base Impacts

Table 4.3.2.11-4 sets forth the number of acres of state land that would have to be disturbed to develop operating bases at each of the potential base locations, and the number of acres in each suitability zone around the bases. It can be seen that the potential base at Delta would use the most state land, with about 1,790 acres. This is about 0.1 percent of the state land in Iron County.

A more complete discussion of project impacts on state land is found in ETR-20.

Table 4.3.2.11-4. State lands disturbed at potential operating base facilities and amount existing in suitability zones.

POTENTIAL OB	ACRES DISTURBED AT OB FACILITIES	ACRES EXISTING IN SUITABILITY ZONES
Beryl	640	21,760
Coyote Spring	0	0
Delta	1,790	12,160
Ely	0	0
Milford	430	30,720
Clovis	0	0
Dalhart	0	0

4079

Irrigated Croplands

IRRIGATED CROPLANDS

INTRODUCTION (4.3.2.12.1.1)

The CEQ guidelines under paragraph 202(b)(4) of NEPA require the analysis of impacts of Prime and Unique Farmlands in all environmental impact statements. Surveys of prime and unique farmlands in the states of Nevada, Utah, New Mexico and Texas, conducted by the USDA, are incomplete. In the absence of prime and unique farmland surveys, a "worse case" impact analysis has been performed which treats all irrigated croplands in the study area as if they were prime farmlands. The discussion below identifies the amount of irrigated croplands and the area of such croplands likely to be disturbed by the M-X deployment.

The irrigated cropland data for Nevada/Utah were obtained from satellite images (LANDSAT). Several publications show the estimated number of acres of irrigated cropland in Nevada. However, these data vary by as much as 100 percent. LANDSAT satellite images have been used to calculate total irrigated acreage in each valley, as well as the potential disturbed acreage. The irrigated cropland areas for Texas/New Mexico were obtained from LANDSAT and the Census of Agriculture, 1974. The deployment layouts were overlayed on the LANDSAT imagery and the area of all irrigated cropland that coincided with DDA facilities was computed.

The tables in this section rate the levels of impact of the potential disturbance that the project could create on private land on a 1 to 4 scale. A definition of the levels of significance is found in the footnotes of each section.

This section will contain a brief statement for each potential base location describing how an alternate location within the suitable zone would impact private lands.

PROPOSED ACTION (4.3.2.12.1.2)

DDA Impacts

Figure 4.3.2.12-1 presents the coincidence of the Proposed Action with its 200 clusters of 23 protective shelters each, and the irrigated cropland for the Nevada/Utah region. The major coincidences of clusters and irrigated cropland are in Snake, Lake, and Monitor Valleys.

Table 4.3.2.12-1 shows the valleys which have irrigated cropland coincident with M-X DDA facilities, the acres of cropland disturbed for both construction and operations purposes, the percentage of each valley's cropland that the disturbed area represents and the level of significance of those disturbances for each valley. Twenty-five of the 41 valleys with proposed clusters have irrigated agriculture, and 10 of these 25 valleys have cropland that could be disturbed by the Proposed Action. An estimated 180 acres of irrigated cropland could be disturbed during construction. After construction, an estimated 77 acres could be returned to agriculture, and 113 acres would remain out of agriculture for the life of the project. The 180 acres and the 113 acres are equal to 0.09 and 0.03 percent of the 380,000 acres of irrigated cropland in the 41 hydrologic subunits. It can be seen that only two of all ten would have a low potential impact.

The impact of the project upon irrigated cropland could be mitigated by assuring that project deployment would not interfere with irrigation systems and access roads to cropland areas. It is anticipated that the majority of this potentially impacted 180 acres of irrigated cropland will be avoided during the Tier Two refinement of shelter and road siting.

Future non-M-X projects such as IPP, WPPP, and Nevada Moly are not expected to directly impact large areas of irrigated cropland although population growth in nearby communities may result in urban development on some croplands if planning measures are not taken in advance. Because of the permanent nature of the shelter structures, it is unlikely that the ground on which they are located would be retrieved for agricultural purposes in the foreseeable future. The roadway system and new Air Force developed water resources could contribute to increased irrigated cropland.

Coyote Spring Valley OB Impacts

Coyote Spring Valley operating base is low density open rangeland. No irrigated croplands would be directly affected by the project. The proposed Milford suitability zone is in open rangeland and excludes presently irrigated agriculture (Figure 4.3.2.12-2). In the past few years the irrigated agriculture south of Milford and west of Minersville has been spreading southward as more land is brought under irrigation. In the vicinity of both the Coyote Spring Valley and the Milford OB locations there is currently irrigated private land. The area requirements of regional growth associated with the base could convert irrigated cropland to urban uses unless the impacted counties or cities decide to enact planning and zoning laws designed to preserve farmland, and enforce such laws. If water requirements at Milford are met through purchase, up to 2,000 acres could be withdrawn from irrigated production (see Groundwater Resources).

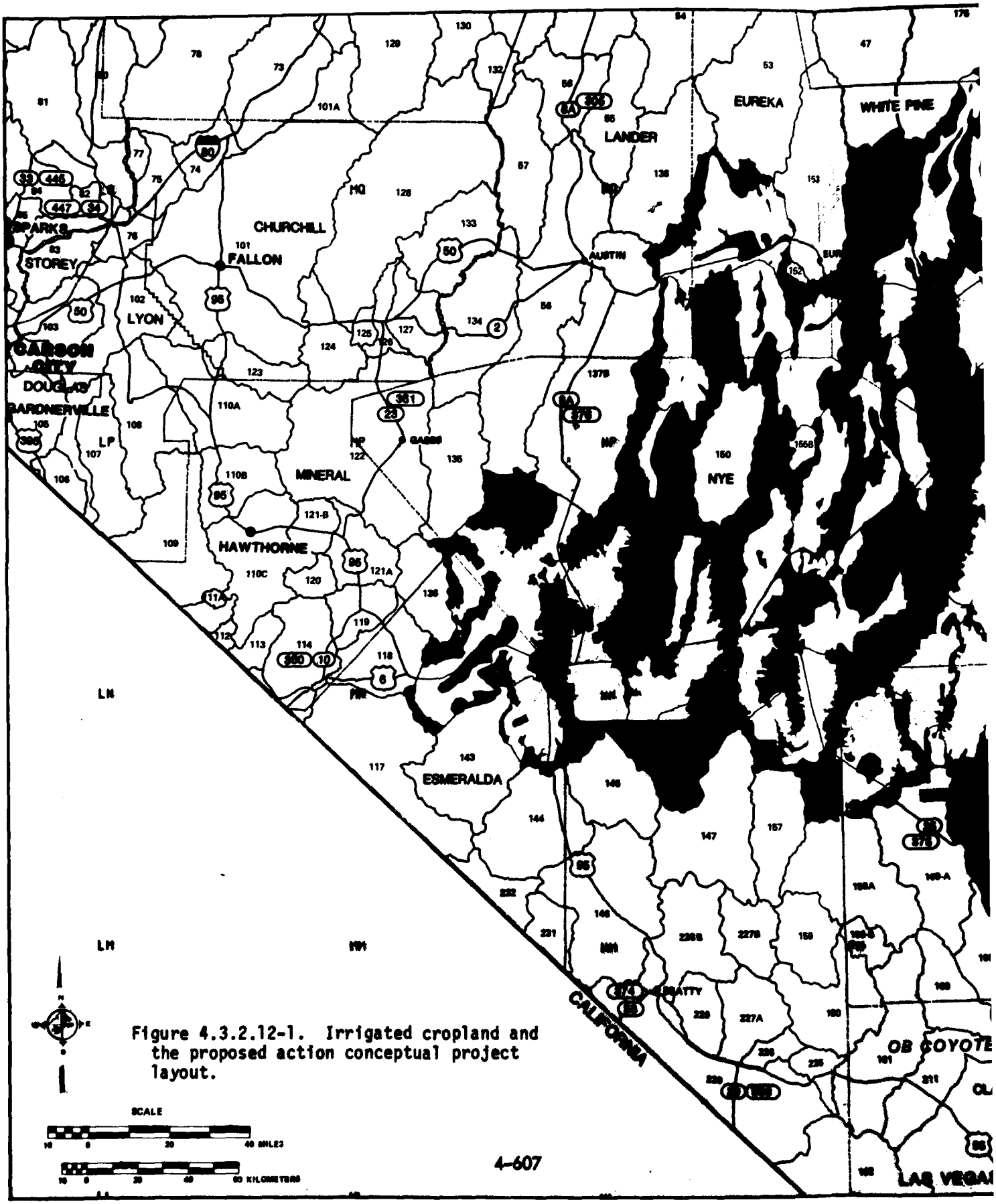
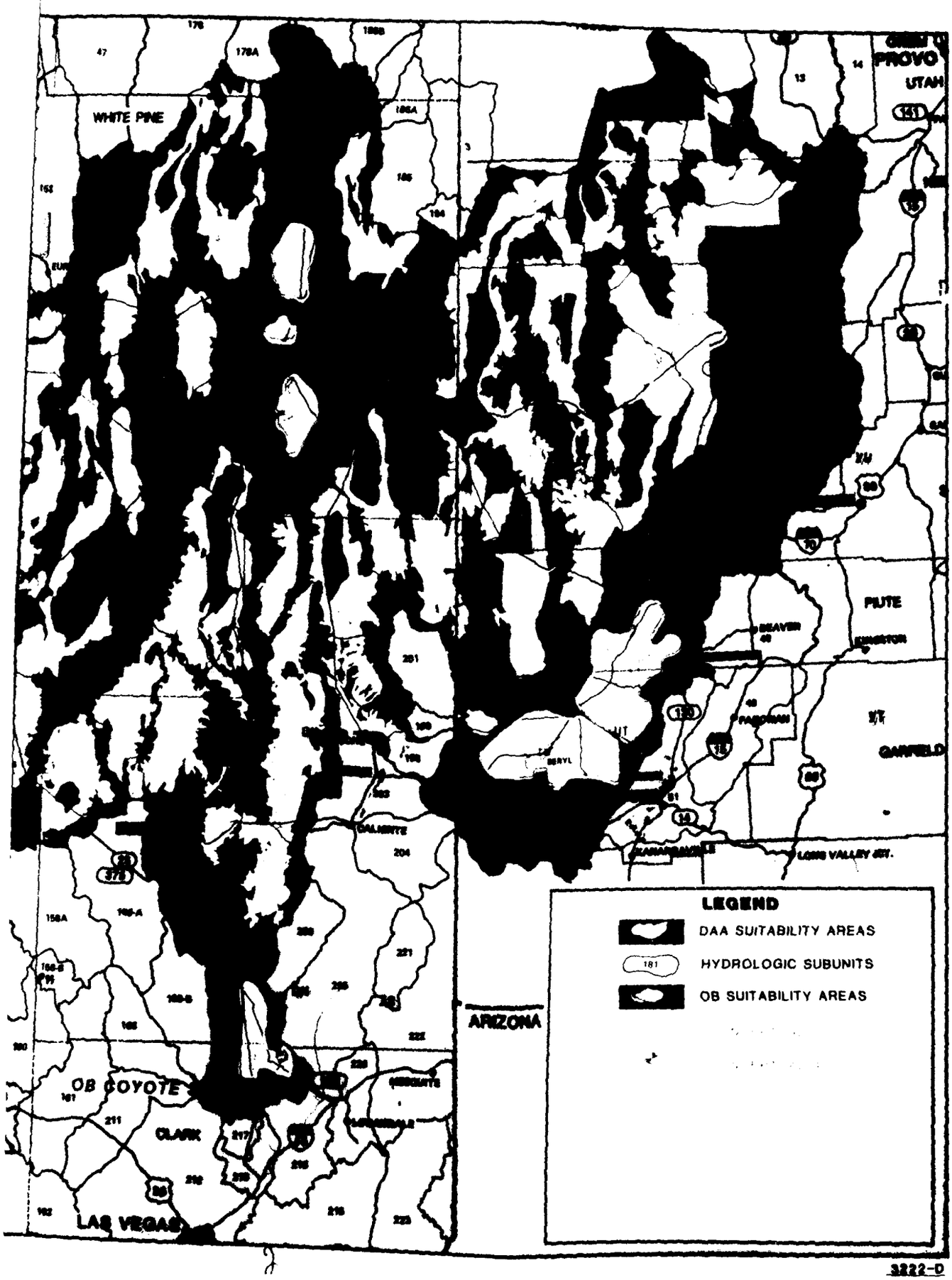


Figure 4.3.2.12-1. Irrigated cropland and the proposed action conceptual project layout.


WHITE PINE
PROVO
UTAH
PIUTE
GARFIELD
BERYL
CALIENTE
ARIZONA
OB COYOTE
CLARK
LAS VEGAS
LEGEND
DAA SUITABILITY AREAS
181
HYDROLOGIC SUBUNITS
OB SUITABILITY AREAS

3222-D

Table 4.3.2.12-1. Potential impact on irrigated cropland in the Nevada/Utah region for the Proposed Action.

HYDROLOGIC SUBUNIT		SHORT-TERM EFFECTS			LONG-TERM EFFECTS		
		IRRIGATED CROPLAND DISTURBED		POTENTIAL IMPACT[1]	IRRIGATED CROPLAND DISTURBED		POTENTIAL IMPACT[1]
NO.	NAME	ACRES	PERCENT OF TOTAL IN HYDRO-SUBUNIT		ACRES	PERCENT OF TOTAL IN HYDRO-SUBUNIT	
	Subunits with M-X Clusters and DTN						
4	Snake	64	0.6		40	0.4	
5	Pine	—	—		—	—	
6	White	—	—		—	—	
7	Fish Springs	—	—		—	—	
8	Dugway	—	—		—	—	
9	Government Creek	5	2.4		3	1.4	
46	Sevier Desert	—	—		—	—	
46A	Sevier Desert & Dry Lake[2]	—	—		—	—	
54	Wah Wah	—	—		—	—	
137A	Big Smoky-Tonopah Flat	5	0.2		3	0.1	
139	Kobeh	4	0.2		3	0.1	
140A	Monitor—Northern	14	0.7		9	0.5	
140B	Monitor—Southern	—	—		—	—	
141	Ralston	—	—		—	—	
142	Alkali Spring	—	—		—	—	
148	Cactus Flat	—	—		—	—	
149	Stone Cabin[2]	—	—		—	—	
151	Antelope	4	1.8		3	1.6	
154	Newark[2]	—	—		—	—	
155A	Little Smoky—Northern	—	—		—	—	
155C	Little Smoky—Southern	—	—		—	—	
156	Hot Creek	—	—		—	—	
170	Penoyer	—	—		—	—	
171	Coal	—	—		—	—	
172	Garden	—	—		—	—	
173A	Railroad—Southern	—	—		—	—	
173B	Railroad—Northern	3	0.03		1	0.02	
174	Jakes[2]	9	2.0		6	1.4	
175	Long	—	—		—	—	
178B	Butte—South	—	—		—	—	
179	Steptoe	—	—		—	—	
180	Cave	—	—		—	—	
181	Dry Lake[2]	—	—		—	—	
182	Delamar	—	—		—	—	
183	Lake	66	1.0		41	0.6	
184	Spring	—	—		—	—	
196	Hamlin	—	—		—	—	
202	Patterson	—	—		—	—	
207	White River	7	0.09		4	0.09	
208	Pahroc	—	—		—	—	
209	Pahranagat	—	—		—	—	
	Overall DDA	180	0.09		113	0.06	

3885-2

[1]
- None. (No cropland disturbed.)
- Low to moderately low impact. (Less than 100 acres or less than 1 percent of cropland disturbed in subunit.)
- Moderate to moderately high impact. (Less than 1,000 acres or less than 3 percent of cropland disturbed in subunit.)
- High impact. (More than 1,000 acres or more than 3 percent of cropland disturbed in subunit.

[2]Conceptual location of Area Support Centers (ASCs).

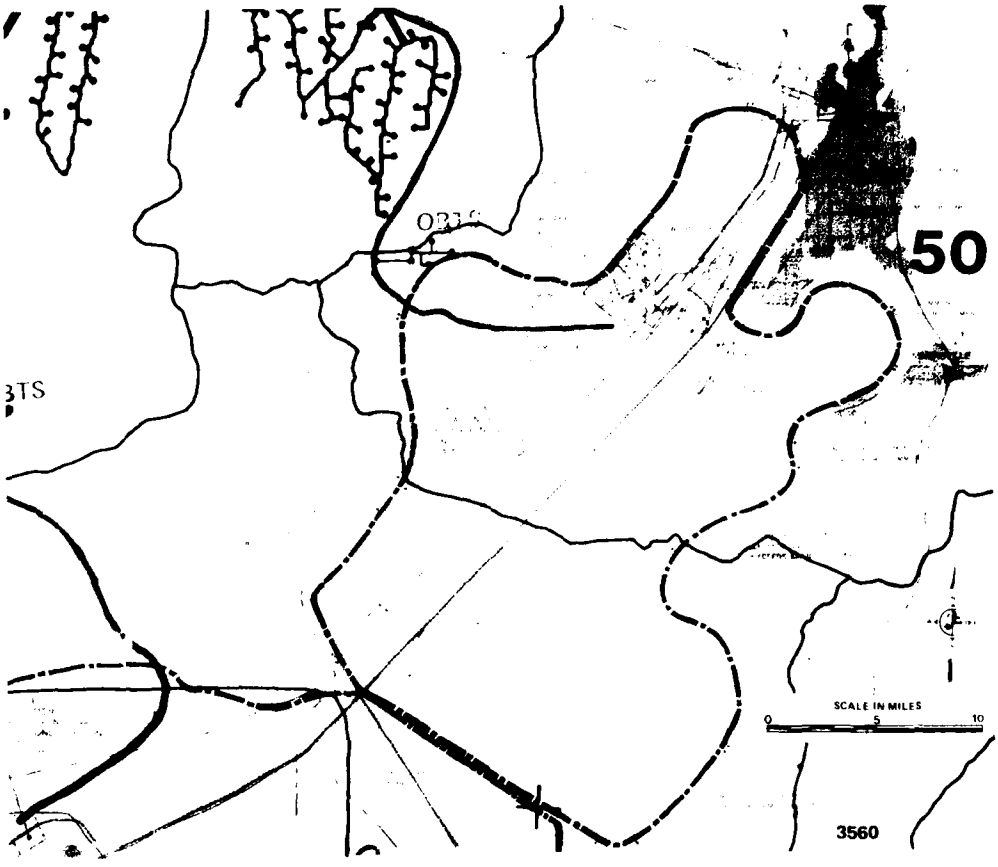


Figure 4.3.2.12-2. Irrigated cropland near the Milford OB suitability zone.

ALTERNATIVE 1 (4.3.2.12.1.3)

The cluster layout for Alternative 1 is the same as for the Proposed Action; therefore the difference in impacts is determined by the OB location.

The first base for Alternative 1 would be located in Coyote Spring Valley and the second base would be located near Beryl, Utah. Coyote Spring Valley is discussed as part of the Proposed Action. The present land use in the Beryl suitability zone is open rangeland (Figure 4.3.2.12-3). No irrigated croplands would be directly affected by the project. Private land in irrigated agriculture is located south of the Beryl suitability zone. This land could potentially be developed by private development as residential and/or commercial unless county laws protecting such farmland were passed and enforced. The protection of rural land would be consistent with state and community expressed goals of focusing M-X stimulated growth in existing communities rather than permitting sprawl. Irrigated croplands could also be reduced in areas if water requirements must be met through purchase of water rights (see Groundwater Resources).

ALTERNATIVE 2 (4.3.2.12.1.4)

DDA irrigated agriculture impacts would be the same as for the Proposed Action. The present use of the areas proposed for the operating bases at both Delta and Coyote Spring Valley is open rangeland (Figure 4.3.2.12-4). No irrigated cropland would be affected by the base development at either site. This is also the case with the suitability zone at each location. However, water requirements could reduce irrigated cropland depending on source of supply decision (see Groundwater Resources).

ALTERNATIVE 3 (4.3.2.12.1.5)

DDA impacts are the same as for the Proposed Action. Beryl, Utah is discussed in Alternative 1. The potential base site near Ely, Nevada under this alternative, is generally open rangeland (Figure 4.3.2.12-5). Irrigated agricultural lands in the suitablity zone are expected to be avoided during Tier 2 analyses and decisionmaking.

ALTERNATIVE 4 (4.3.2.12.1.6)

DDA impacts on irrigated agriculture would be the same as for the Proposed Action. The present land use at the proposed base locations at Beryl, Utah and Coyote Spring Valley, Nevada is open rangeland, and no irrigated cropland would be used or impacted. If water rights are purchased at Beryl, some impacts on irrigated acreage would occur from the loss of up to 2,000 acres (see Groundwater Resources).

ALTERNATIVE 5 (4.3.2.12.1.7)

The DDA impacts on irrigated agriculture would be the same for the Proposed Action. The present land use of the proposed base locations near Milford, Utah and Ely, Nevada is open rangeland, and no irrigated cropland would be used. Purchased water rights at Milford could remove 2,000 irrigated acres from crop production (see Groundwater Resources).

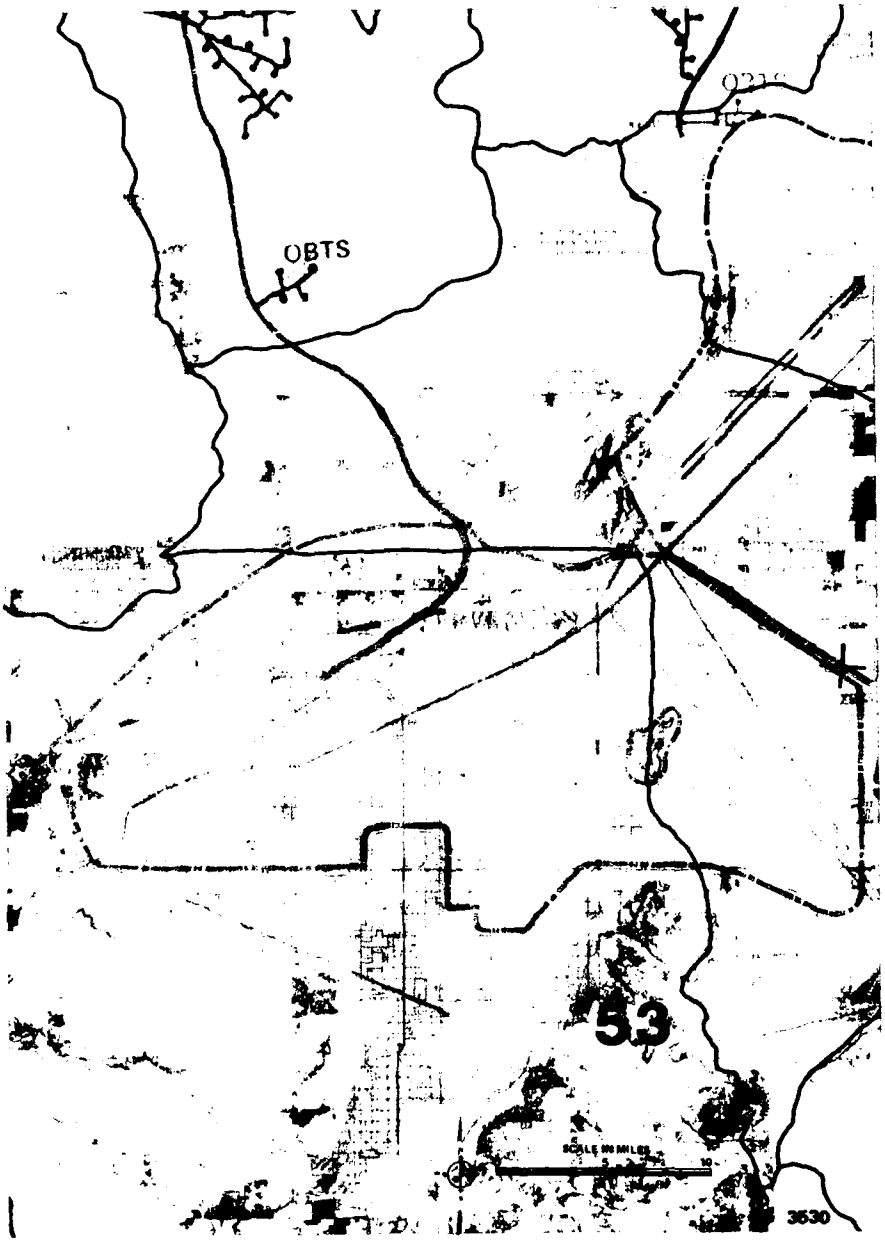


Figure 4.3.2.12-3. Irrigated cropland near the Beryl OB suitability zone.

Figure 4.3.2.12-4. Irrigated cropland near the Delta OB suitability zone.

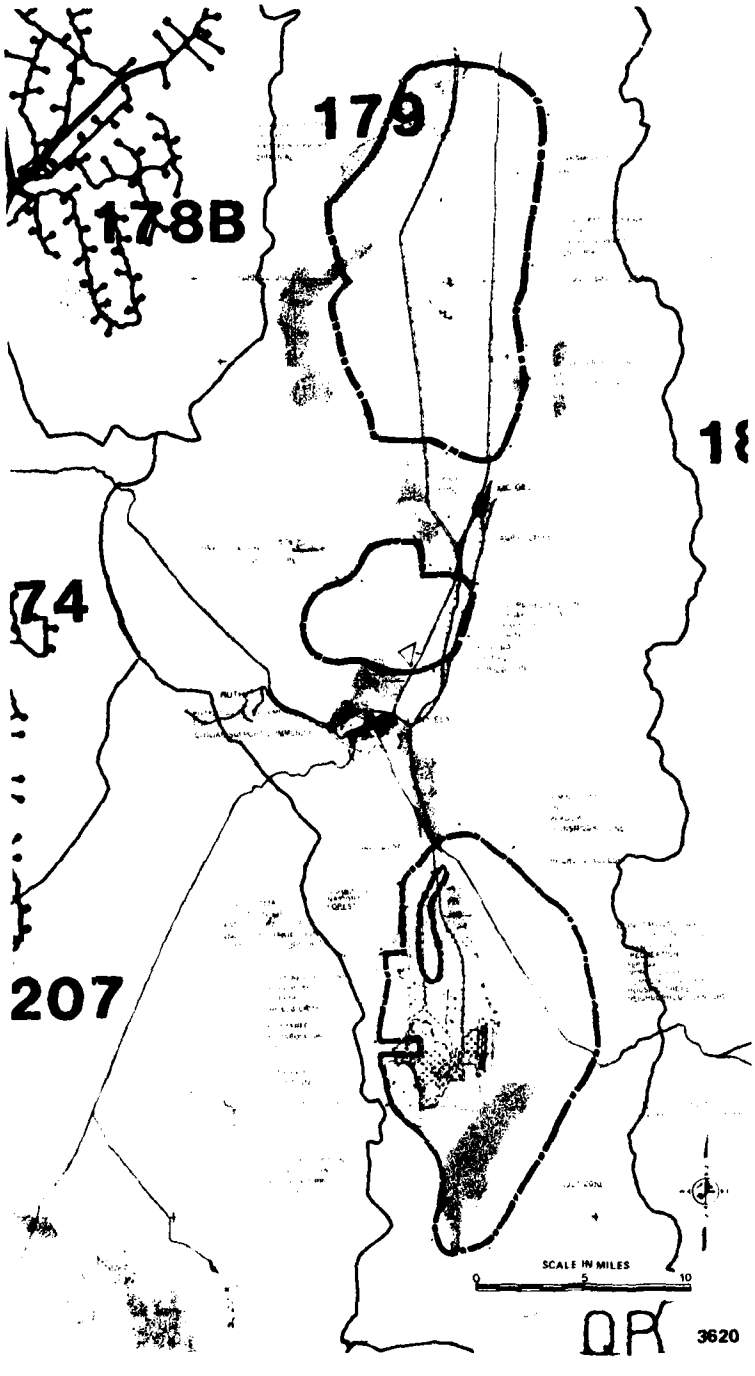


Figure 4.3.2.12-5. Irrigated cropland in the Ely OB vicinity.

ALTERNATIVE 6 (4.3.2.12.1.8)

The DDA impacts on irrigated agriculture would be the same for the Proposed Action. The present land use at the proposed base locations near Milford, Utah and Coyote Spring Valley, Nevada, is open grazing land, and no irrigated cropland would be used or directly impacted. Purchased water rights could impact up to 2,000 acres of irrigated cropland (see Groundwater Resources).

ALTERNATIVE 7 (4.3.2.12.1.9)

DDA Impacts

Under Alternative 7, there will be a total of 200 clusters of 23 PSs each deployed in the Texas/New Mexico region, as shown on Figure 4.3.2.12-6. That figure also shows the location of the irrigated cropland and counties in the region.

Table 4.3.2.12-2 shows the counties in the Texas/New Mexico study area, the the number of acres of irrigated cropland that would be disturbed by both construction and operation phases of the project, the percentage of the total acres of irrigated cropland in the county that the disturbed acres represent, and the level of potential impact that those disturbances represent. All together, about 9,100 acres of irrigated cropland could be disturbed by the construction phase under Alternative 7. About 3,900 of these acres could be returned to agricultural use upon completion of construction leaving about 6,300 acres remaining out of agricultural use for the life of the project. The 9,100 and 6,300 acres represent 0.3 and 0.2 percent of the 3,194,000 acres of irrigated cropland in the Texas/New Mexico study area counties.

Future non-M-X projects such as the Tolk Power Plants, Highway I-27, and the CO2 pipelines are not expected to significantly disturb irrigated cropland in the Texas/New Mexico region. Because of the permanent nature of PSs, it is unlikely that the ground on which they are located could be retrieved for agricultural purposes in the foreseeable future. The roadway system, however, could be returned to their original agriculture use upon decommissioning of the project. In many instances, however, the roadway system could remain open to public use where they could better serve public purposes. The roadway system and new Air Force developed water resources could contribute to increased irrigated cropland.

The impact of the project upon irrigated cropland could be mitigated by assuring that project deployment would not interfere with irrigation systems, that access roads to farm areas remain open, and that natural drainage ways remain unimpeded whenever possible. These issues will be addressed during Tier 2 analyses and decisionmaking. Because about 85 percent of the irrigated cropland in the Texas/New Mexico region occurs in the State of Texas, the impact on such croplands could be mitigated by relocating as many clusters as practical to in New Mexico. However relatively little additional suitable land is available in this region.

Clovis OB Impacts

The proposed operating base near Clovis would require about 3,520 acres of irrigated cropland, for the year life of the project. The crops that are produced on the site are corn, wheat, and grain, which are rotated on a seasonal basis. The 3,500

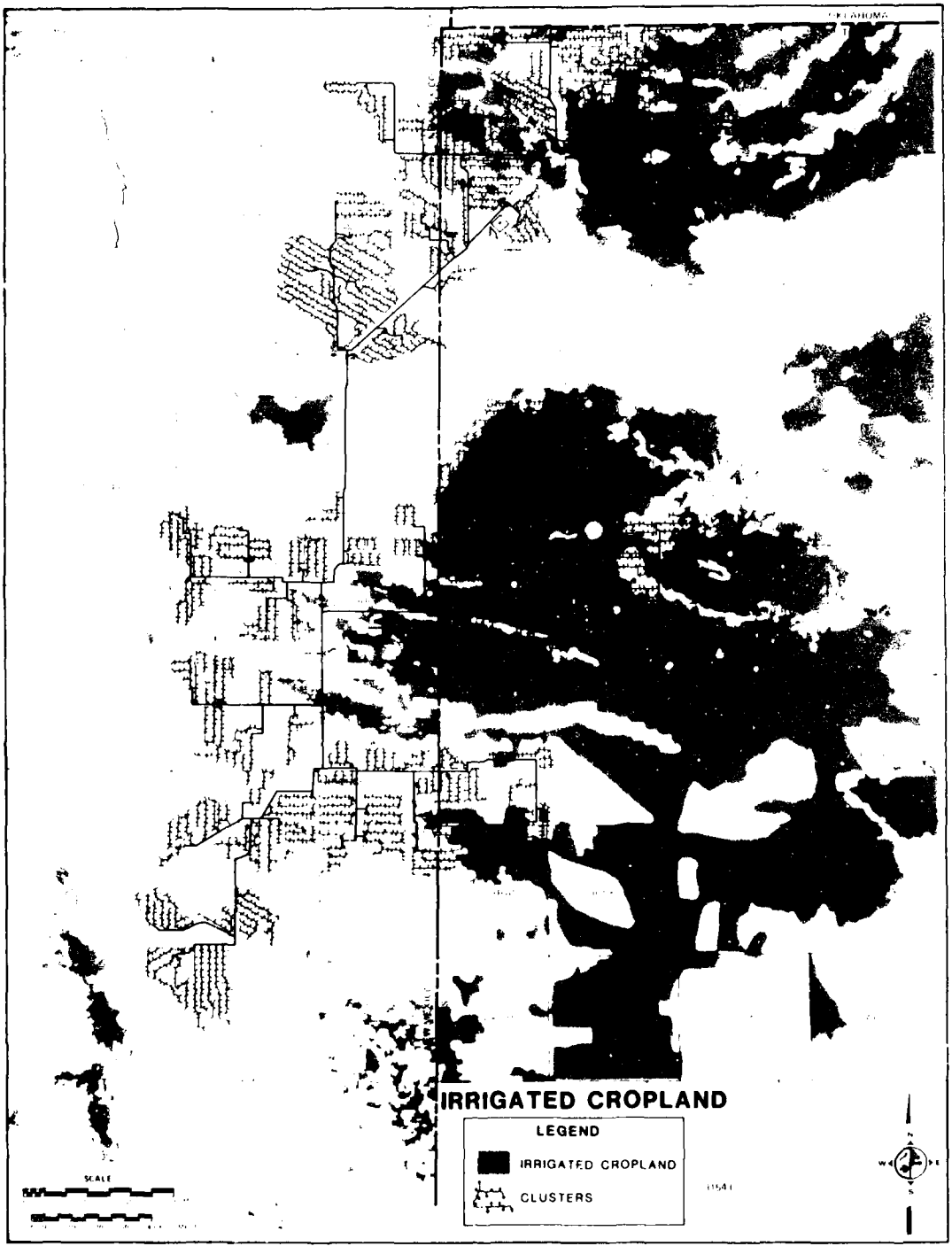


Figure 4.3.2.12-6. Irrigated cropland, Texas/New Mexico, and Alternative 7.

Table 4.3.2.12-2. Potential impact to irrigated cropland in Texas/New Mexico for Alternative 7.

COUNTY	SHORT-TERM EFFECTS			LONG-TERM EFFECTS		
	IRRIGATED CROPLAND DISTURBED		POTENTIAL IMPACT[1]	IRRIGATED CROPLAND DISTURBED		POTENTIAL IMPACT[1]
	ACRES	PERCENT OF TOTAL IN COUNTY		ACRES	PERCENT OF TOTAL IN COUNTY	
Counties with M-X Clusters and DTN						
Bailey, TX	88	0.07		55	0.33	
Castro, TX	1,097	0.37		684	0.23	
Cochran, TX	19	0.62		12	0.39	
Dallam, TX	1,513	1.42		981	0.89	
Deaf Smith, TX[2]	1,692	0.71		1,056	0.44	
Hartley, TX[2]	508	0.60		317	0.37	
Hockley, TX	10	0.006		6	0.004	
Lamb, TX	890	0.32		555	0.20	
Oldham, TX	64	0.43		40	0.27	
Parmer, TX	2,254	0.66		1,406	0.41	
Randall, TX	70	0.09		44	0.06	
Sherman, TX	160	0.01		100	0.06	
Swisher, TX	376	0.15		235	0.09	
Chaves, NM	0	0		0	0	
Curry, NM	165	0.11		103	0.07	
DeBaca, NM	2	0.03		1	0.02	
Guadalupe, NM						
Harding, NM	8	0.11		5	0.07	
Lea, NM	0	0		0	0	
Quay, NM	30	0.08		19	0.05	
Roosevelt, NM[2]	34	0.04		21	0.02	
Union, NM	99	0.37		62	0.23	
Texas Total (DDA)	8,741	0.40		6,129	0.20	
New Mexico Total (DDA)	338	0.01		211	0.01	
Total for DDA	9,079	0.30		6,340	0.20	

3886-3

[1]

No impact. (No cropland disturbed.)

Low impact. (Less than 100 acres or less than 1 percent of cropland disturbed in county.)

Moderate impact. (Less than 1,000 acres or less than 3 percent of cropland disturbed in county.)

High impact. (More than 1,000 acres or more than 3 percent of cropland disturbed in county.)

[2]Conceptual location of Area Support Centers (ASCs).

acres represents about 2.4 percent of the 143,000 acres of irrigated cropland in Curry County (Department of Commerce, 1977).

To mitigate the impact on irrigated croplands, care can be taken to assure that the development of base facilities does not interfere with irrigation systems and natural drainage areas. Relocation of the base or annexation in another location would not be as desirable if the existing runways at Cannon AFB were to be used and if the existing master plan for housing at Cannon were to be complied with.

Dalhart OB Impacts

The present use of the proposed site near Dalhart is privately owned grazing land, and no irrigated cropland would be disturbed by the project. Relocation of the proposed base location within the suitable zone would not change this condition.

ALTERNATIVE 8 (4.3.2.12.1.10)

Alternative 8 is a split basing system with 70 clusters in Nevada, 30 in Utah, 35 in Texas, and 65 in New Mexico. The deployment system for the Nevada/Utah region is shown on Figure 4.3.2.12-7 together with cluster coincidence with irrigated cropland. Figure 4.3.2.12-8 shows this information for the Texas/New Mexico portion of Alternative 8.

Because of the permanent nature of the shelter structures, it is unlikely that the ground on which they would be located could be retrieved for agricultural purposes in the foreseeable future, unless they are physically removed and the earth restored. The roadway systems, however, could be returned to their original agricultural use upon decommissioning of the project. In many instances, however, the roadway system could remain open to public use where they could better serve public purposes and access to existing farmlands. Further, new Air Force developed water resources could contribute to increased irrigated cropland.

The impact of the project upon irrigated cropland could be mitigated by assuring that project deployment would not interfere with irrigation systems, that access roads to farmlands remain open, and that natural drainage areas remain unimpeded. With only slight modification to the system layout as anticipated by Tier Two refinement, all croplands in Nevada/Utah could be avoided. In Texas/New Mexico, however, more extreme modification of the system layout would be required to avoid using any irrigated cropland.

Nevada/Utah

Table 4.3.2.12-3 shows the valleys in the Nevada/Utah study area which have proposed clusters which coincide with irrigated cropland for Alternative 8, the number of acres of irrigated cropland that would be disturbed by both the construction phase and operations phase of the project, the percentage of each irrigated cropland that the disturbed area represents, and the level of potential impact those disturbed acres for each valley. All together, 92 acres of irrigated cropland would be disturbed by the construction phase and 57 acres by the operations phase. These acreages represent 0.02 percent and 0.015 percent, respectively, of the total acres of irrigated cropland in the Nevada/Utah study area counties (Bureau of the Census, 1979). The 35 acre difference between construction and

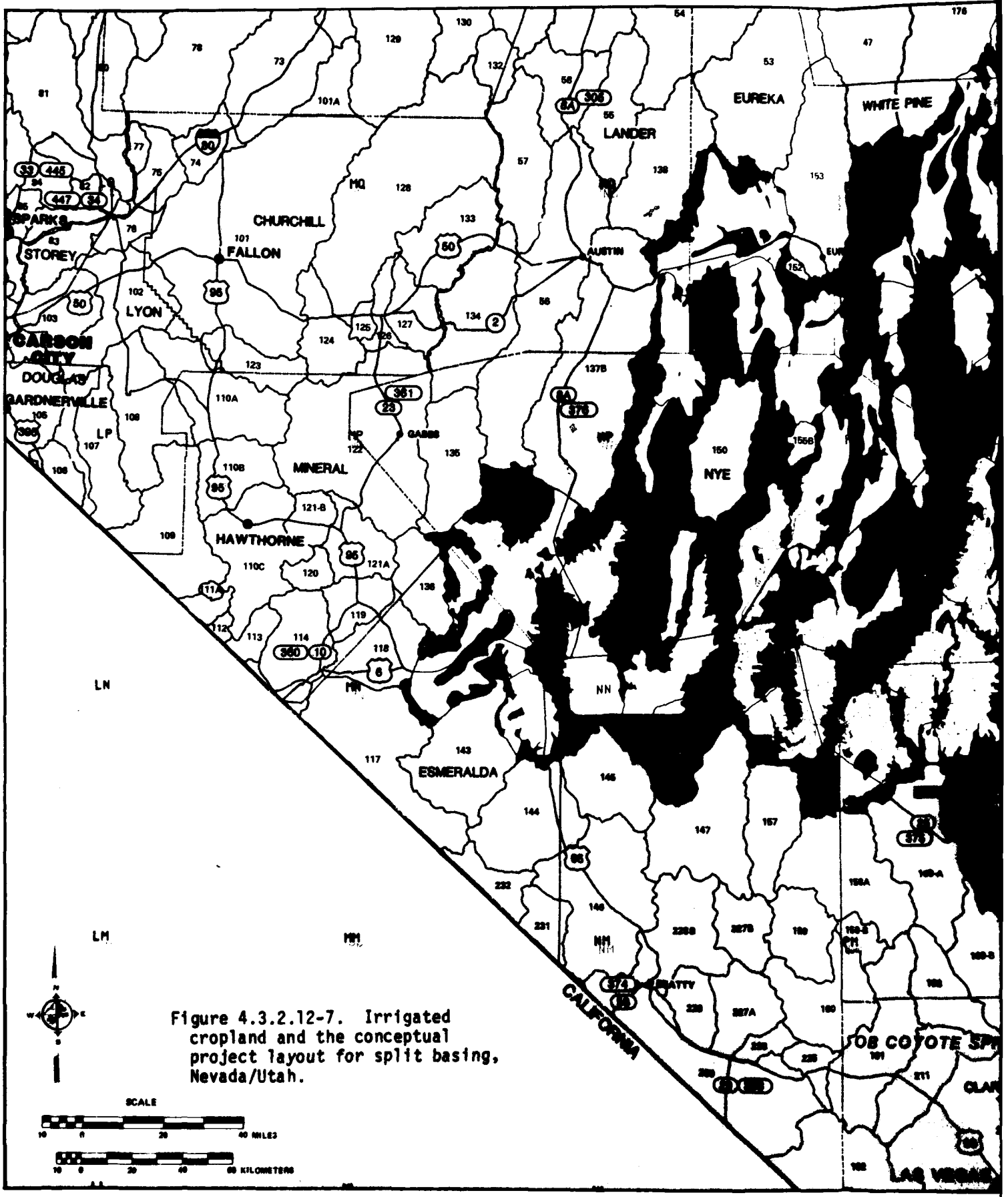
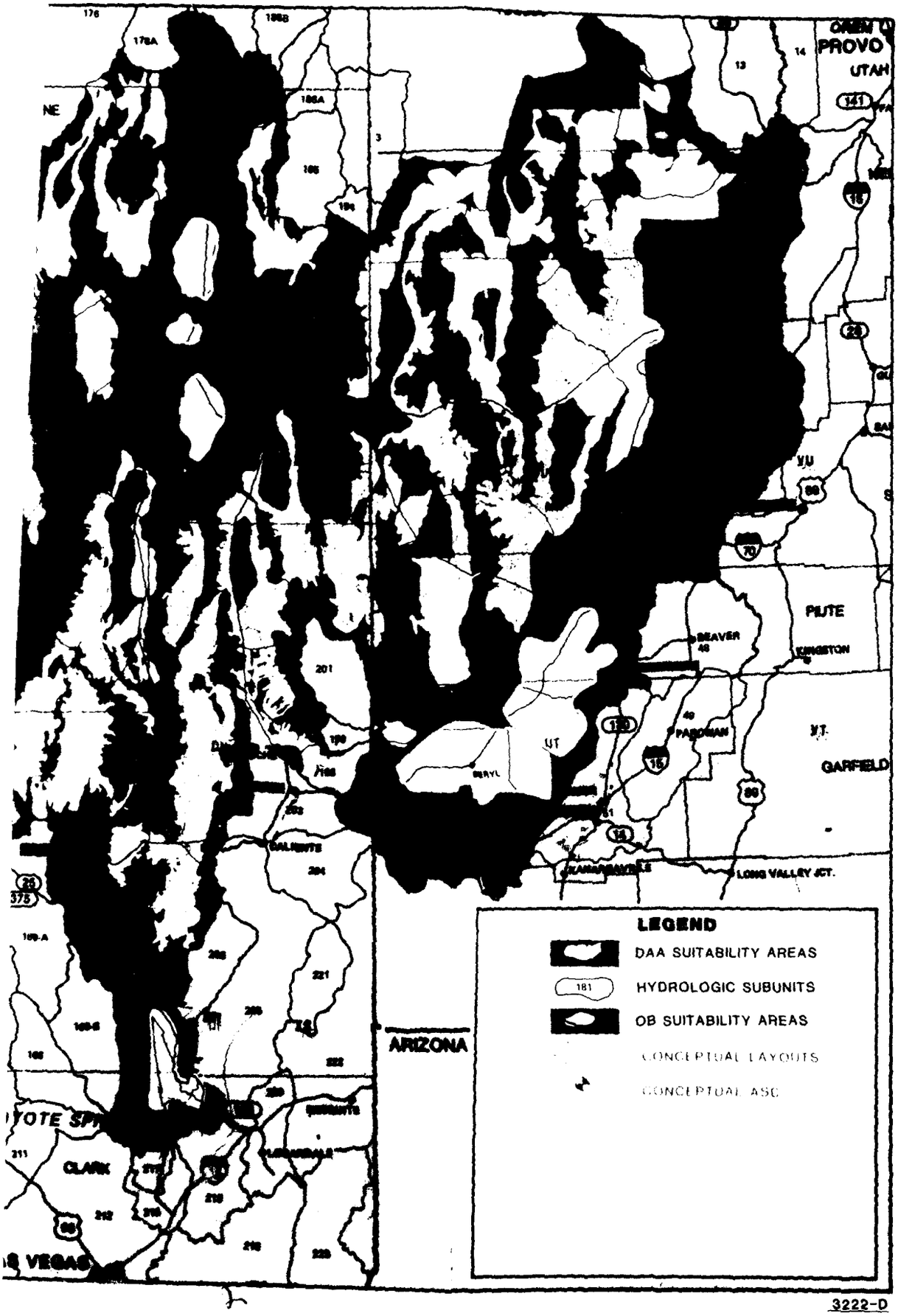


Figure 4.3.2.12-7. Irrigated cropland and the conceptual project layout for split basing, Nevada/Utah.


PROVO
UTAH
PIUTE
BEAVER
GARFIELD
ARIZONA
CLARK
LOGAN VALLEY JCT.
LEGEND
DAA SUITABILITY AREAS
181
HYDROLOGIC SUBUNITS
OB SUITABILITY AREAS
CONCEPTUAL LAYOUTS
CONCEPTUAL ASC

3222-D

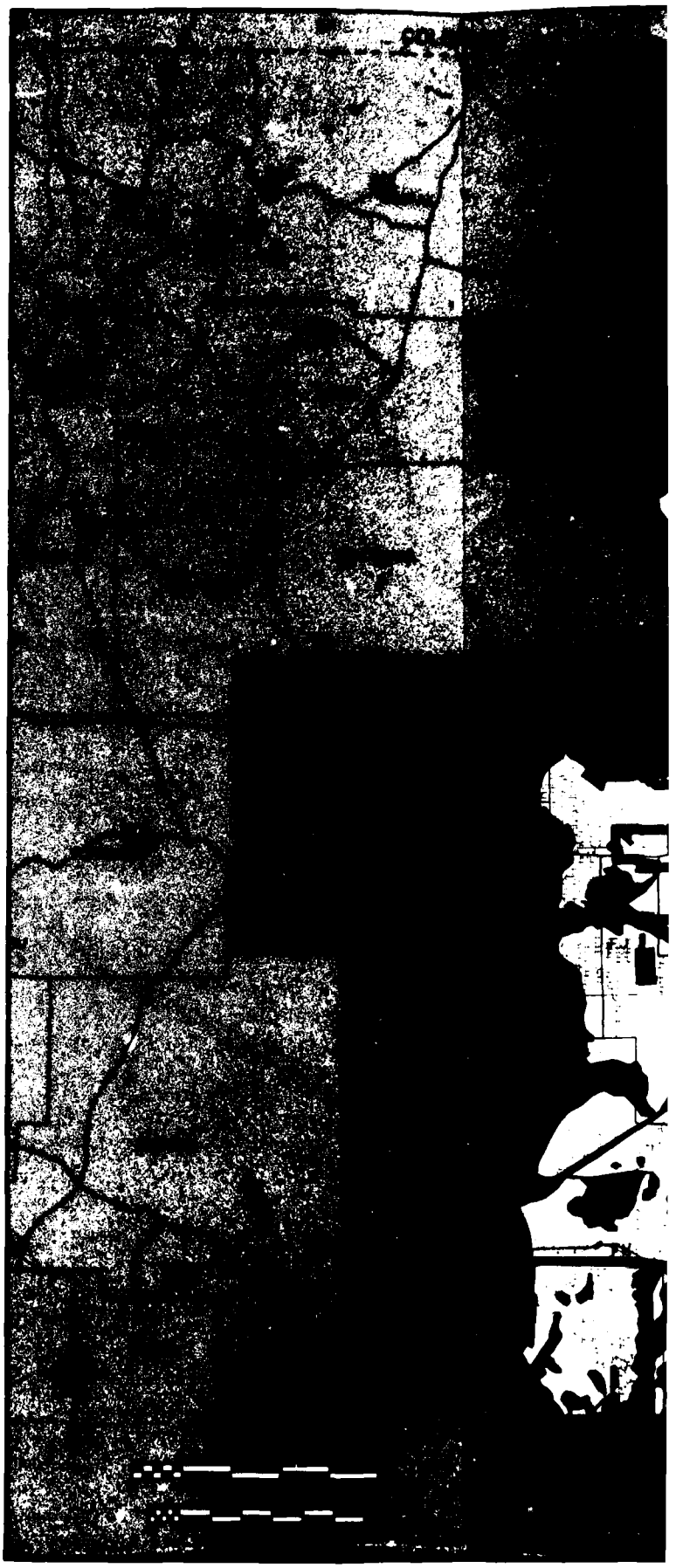
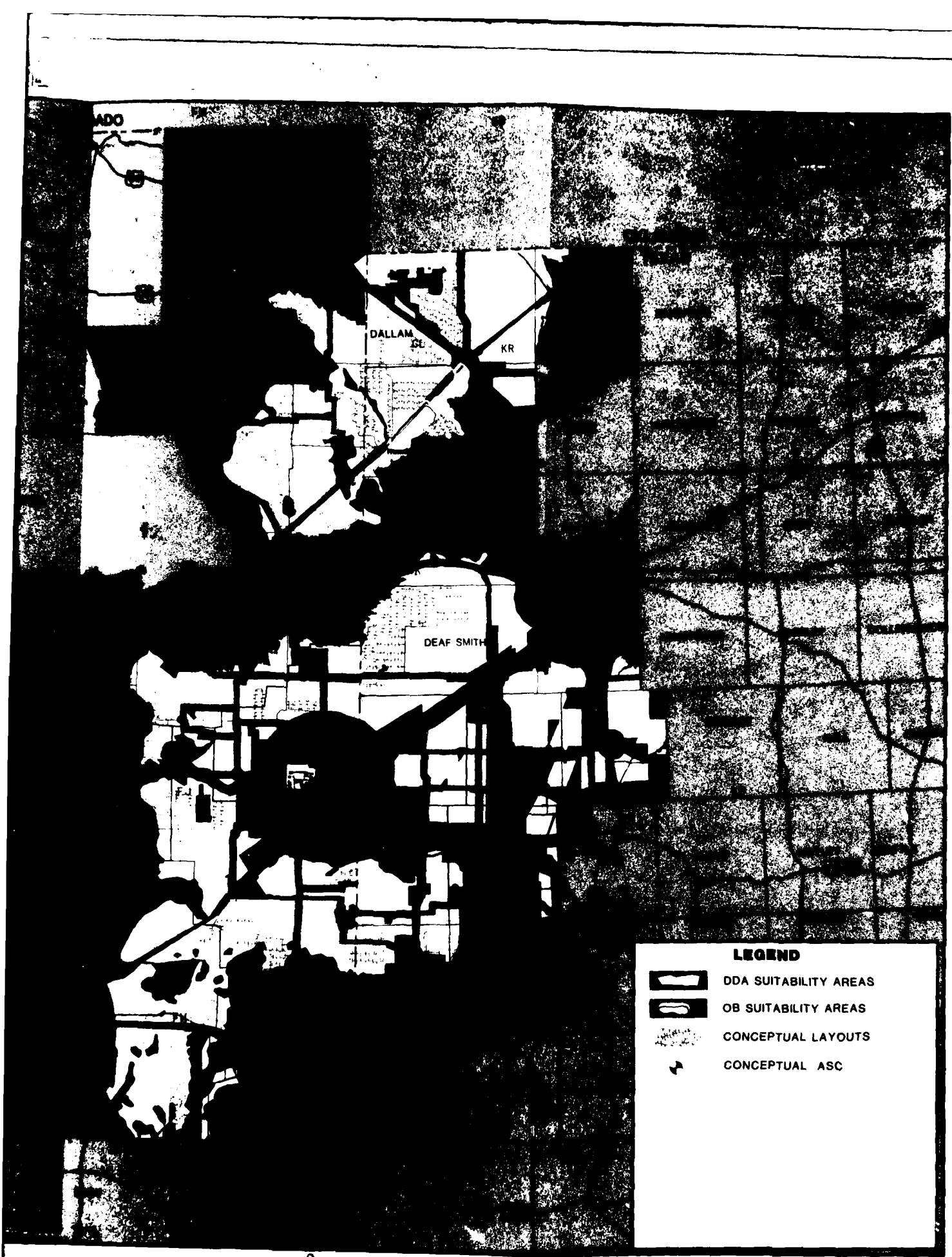


Figure 4.3.2.12-8. Irrigated cropland and the conceptual project layout for split basing, Texas/ New Mexico.


DALLAM
KR
DEAF SMITH
LEGEND
DDA SUITABILITY AREAS
OB SUITABILITY AREAS
CONCEPTUAL LAYOUTS
CONCEPTUAL ASC

3234-D

Table 4.3.2.12-3. Potential impact on irrigated cropland in Nevada/ Utah and Texas/New Mexico regions for Alternative 8.

HYDROLOGIC SUBUNIT OR COUNTY		SHORT-TERM EFFECTS			LONG-TERM EFFECTS		
		IRRIGATED CROPLAND DISTURBED		POTENTIAL IMPACT[1]	IRRIGATED CROPLAND DISTURBED		POTENTIAL IMPACT[1]
NO.	NAME	ACRES	PERCENT OF TOTAL IN SUBUNIT OR COUNTY		ACRES	PERCENT OF TOTAL IN SUBUNIT OR COUNTY	
	Subunits or Counties with M-X Clusters and DTN						
4	Snake[2]	26	0.3		16	0.2	
5	Pine	—	—		—	—	
6	White	—	—		—	—	
7	Fish Springs	—	—		—	—	
46	Sevier Desert	—	—		—	—	
46A	Sevier Desert & Dry Lake	—	—		—	—	
54	Wah Wah	—	—		—	—	
155C	Little Smoky—Southern	—	—		—	—	
156	Hot Creek	—	—		—	—	
170	Penoyer	—	—		—	—	
171	Coal[2]	—	—		—	—	
172	Garden	—	—		—	—	
173A	Railroad—Southern	—	—		—	—	
173B	Railroad—Northern	—	—		—	—	
180	Cave	—	—		—	—	
181	Dry Lake	—	—		—	—	
182	Delamar	—	—		—	—	
183	Lake	66	1.0		41	0.6	
184	Spring	—	—		—	—	
196	Hamlin	—	—		—	—	
202	Patterson	—	—		—	—	
207	White River	—	—		—	—	
	Bailey, TX	—	—		—	—	
	Cochran, TX	19	0.02		12	0.01	
	Dallam, TX	419	0.38		261	0.24	
	Deaf Smith, TX	812	0.34		507	0.21	
	Hartley, TX	377	0.44		223	0.27	
	Hockley, TX	10	0.006		6	0.004	
	Lamb, TX	—	—		—	—	
	Oldham, TX	—	—		—	—	
	Parmer, TX	—	—		—	—	
	Chaves, NM	—	—		—	—	
	Curry, NM	24	0.02		15	0.01	
	DeBaca, NM	2	0.03		1	0.02	
	Guadalupe, NM	—	—		—	—	
	Harding, NM	8	0.11		5	0.07	
	Lea, NM	—	—		—	—	
	Quay, NM[2]	23	0.06		14	0.04	
	Roosevelt, NM[2]	17	0.02		11	0.01	
	Union, NM	72	0.27		45	0.17	
	Overall Nevada/Utah DDA	—	—		—	—	
	Overall Texas/New Mexico DDA	—	—		—	—	
	Overall Alternative 3	—	—		—	—	

3887-3

No impact. (No irrigated cropland disturbed.)

Low impact. (Less than 100 acres or less than 1 percent of irrigated cropland disturbed in subunit or county.)

Moderate impact. (Less than 1,000 acres or less than 3 percent of irrigated cropland disturbed in subunit or county.)

High impact. (More than 1,000 acres or more than 3 percent of irrigated cropland disturbed in subunit or county.)

[2]Conceptual location of Area Support Centers (ASCs).

operations could be returned to agricultural use upon completion of the construction phase.

Future non-M-X projects such as IPP, WPPP, and Nevada Moly are not expected to impact irrigated cropland in the Nevada/Utah region, although population growth in nearby areas could result in urban encroachment on some croplands.

The present use of the operating base site in Coyote Spring Valley is for low density open rangeland, and no irrigated croplands would be impacted by the project. Impacts would be the same as for the Proposed Action.

Texas/New Mexico

Table 4.3.2.12-3 shows the study area counties in the Texas/New Mexico region, the number of acres of irrigated cropland in each county, and the number of acres of such croplands that would be disturbed by Alternative 8 for both construction and operations phases of the project. Also shown are the percentage of the total county irrigated cropland that the disturbed areas represents, and the level of potential impact of those disturbances. All together, 1,783 acres of irrigated cropland could be disturbed by the construction phase, and 1,089 acres by the operations phase. These acreages represent 0.06 and 0.04 percent respectively of the 3,184,000 acres of irrigated cropland in the Texas/New Mexico study area counties (Dept. of Commerce, 1979). The 620 difference between the construction acreage disturbed and the operations acreage disturbed could be returned to agricultural use after the completion of construction.

Future non-M-X projects such as the Tolk power plants, Highway I 27, and the CO2 pipelines are not expected to use significant amounts of irrigated croplands.

The second operating base would be located at Clovis, New Mexico. The impacts and mitigations are the same as in Alternative 7.

DRY CROPLANDS

Nevada/Utah Region

Little dry land farming takes place in the arid Nevada/Utah region, and no project impacts on dry cropland farming in the region are anticipated.

Texas/New Mexico Region

For full deployment in the Texas/New Mexico region, about 27,000 acres of dry cropland would be disturbed by the construction phase. This is 0.007 percent of the 3.8 million acres of dry cropland in the region's study area counties. About 60 percent of the disturbed dry croplands would be in Texas, about 18,400 acres (64 percent) in Bailey, Dallam, Deaf Smith, Curry, Quay, and Roosevelt counties. The maximum impact would be in Dallam County where about 5,500 acres or 2.4 percent of that county's dry cropland. During the oprations phase, about 16,000 acres would be disturbed. This is about 60 percent of that disturbed during construction and represents 0.004 percent of the total dry cropland acreage.

Operating Bases

Of the seven potential operating bases, dry cropland would only be disturbed at the Clovis site. Two thousand eight hundred acres, of 0.7 percent of Curry County's dry cropland would be disturbed.

A more complete discussion on impacts on dry croplands is found in ETR-20.

Homes and Ranches

HOMES AND RANCHES

INTRODUCTION (4.3.2.12.2.1)

In order to assure resident safety around the protective structures, no habitable buildings will be allowed within a 2,965 foot radius circle around each Protective Structure. This area is called the explosive safety Quantity-Distance (QD) zone. The purpose of the zone is to provide safety to residents from potential accidental explosion of missile propellant.

Figure 4.3.2.12-9 shows how the QD zones could affect existing homes and ranches in the DDAs. Whenever a home would fall within the QD zone of a proposed PS the first attempt would be to move the PS to a location at least 2,965 feet from the home (see Section 1.7.3 - Tiered Decision-Making). If this could not be done because of the proximity of other PSs, or is impractical because of the topography or other physical problems, it would be necessary to remove the home.

If it is possible and the owner is willing, the home would be relocated onto the same parcel but outside the QD zone, as with Home A, on Figure 4.3.2.12-9. If that option is not practical or acceptable, the home would either be relocated onto another parcel outside the QD zone, or the owner would be compensated for the value of the home and then it would be removed.

The number of homes and ranches that would potentially have to be relocated have been counted for the DDAs shown in the conceptual layout. The effect in the base locations would be negligible and is not considered here.

PROPOSED ACTION (4.3.2.12.2.2)

DDA Impacts

Under the Proposed Action, a maximum of ten buildings would have to be relocated as the result of the QD zones. Six of the ten relocations would be in Nye County. No relocations would be necessary in Utah. Tier Two refinement would probably negate the necessity to relocate any ranches or homes in the Nevada/Utah

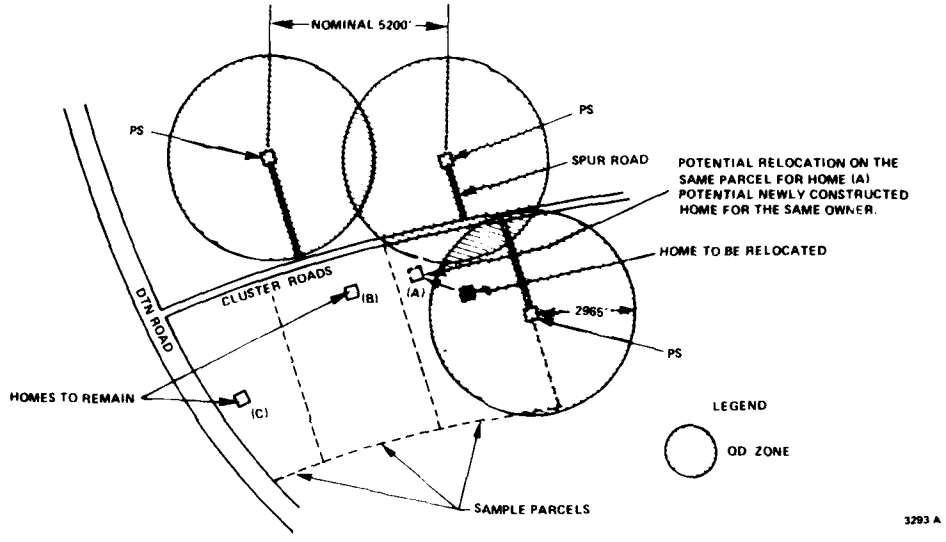


Figure 4.3.2.12-9. Effect of quantity distance zones on ranches and homes.

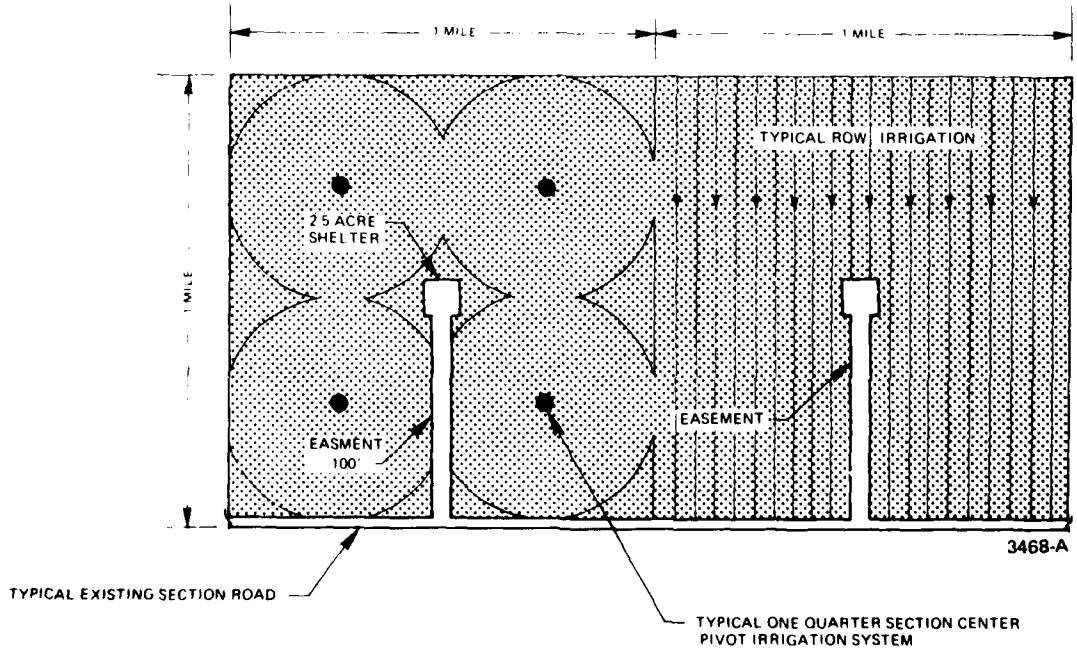


Figure 4.3.2.12.-9A. Depiction of a 2.5 acre shelter deployment in circle and row irrigated sections.

region. The potential relocations are not considered to be a significant impact since it is not expected that they would occur.

ALTERNATIVE 1 THROUGH 6 (4.3.2.12.2.8)

Impacts are the same as under Proposed Action.

ALTERNATIVE 7 (4.3.3.11.2.9)

Table 4.3.2.12-4 shows that approximately 1,300 homes and ranches fall within the QD zones in the Texas/New Mexico region. This number reflects the relatively higher rural dwelling unit and population density of the High Plains region. Potential relocations in Texas exceed those in New Mexico by about two to one with almost half of the Texas relocations being in Deaf Smith County (146) and Parmer County (225). About sixty percent of the New Mexico relocations are in Roosevelt County (297).

Even with monetary compensation, the necessity to relocate one's home or ranch is a serious matter. In 11 of the 22 counties in the Texas/New Mexico region, the potential for relocation exceeds 50 homes and ranches. The impact in those counties is considered to be highly significant (Table 4.3.2.12-4). It is anticipated that Tier 2 siting could avoid up to 10 homes in any one county so no impact is ascribed at that level. To the individual impacted homeowner, loss, or even relocation of the homestead would be significant.

Federal land acquisition offers a number of options to minimize the impact to the farmers and homeowners where relocation is involved. The policies are established by the Uniform Land Acquisition Act, PL 91-646, 42 USC 4601 et. seq. (1972). The federal purchaser must initiate the process by making a bona fide offer of just compensation. This includes the fair market value of the property taken; compensation for loss in value or utility to the remainder ("severance damage"), and relocation costs.

Fair market value is generally defined as what a willing buyer would pay a willing seller, dealing at arms length and neither being compelled to deal. Neither loss of value to the property, nor enhancement in its value, resulting from the project are taken into account. A common example of severance damage occurs where a road right-of-way is taken through a farm, making plowing and harvesting operations on the remainder slower and less efficient.

Figure 4.3.2.12-9A depicts two types of impacts upon farmland which would affect the value of the farm. In the left section of 640 acres, a 2.5 acre shelter area and an access road would reduce the total amount of cropland harvested. A direct easement would not impact the typical quarter-section center pivot irrigation systems.

For row crops, Figure 4.3.2.12-9A shows that the flood irrigation system would be minimally impacted if direct easement were parallel with the rows and with the drainage. A cluster access roads that cut across the drainage would require extensive channeling along the road and large piped under the easement to ensure irrigation to the impacted quarter-section. In both center pivot and row irrigated cases the right-of-way has the potential to make plowing, irrigating, and harvesting

Table 4.3.2.12-4. Potential impacts to homes and ranches in Texas/ New Mexico DDA for Alternatives 7 and 8.

COUNTY	ALTERNATIVE 7			ALTERNATIVE 8		
	POTENTIAL NUMBER OF HOUSING UNITS WHICH COULD BE RELOCATED	PERCENT OF HOUSING UNITS IN COUNTY WHICH COULD BE RELOCATED	POTENTIAL IMPACT[1]	NUMBER OF HOUSING UNITS WHICH COULD BE RELOCATED	PERCENT OF HOUSING UNITS WHICH COULD BE RELOCATED	POTENTIAL IMPACT[1]
Bailey, TX	118	4.1		6	0.2	
Castro, TX	82	2.6		0	0	
Cochran, TX	5	0.3		3	0.2	
Dallam, TX	103	4.4		17	0.7	
Deaf Smith, TX[2]	146	2.4		32	0.5	
Hartley, TX	31	3.1		5	0.5	
Hockley, TX	0	0.0		0	0	
Lamb, TX	62	0.9		0	0	
Oldham, TX	12	1.7		0	0	
Parmer, TX	225	6.5		0	0	
Randall, TX	17	0.2		0	0	
Sherman, TX	2	0.2		0	0	
Swisher, TX	25	0.7		0	0	
Chaves, NM	6	< 0.1		6	< 0.1	
Curry, NM	74	0.6		2	< 0.1	
DeBaca, NM	9	0.7		6	0.5	
Guadalupe, NM	0	0		0	0.0	
Harding, NM	4	0.7		4	0.7	
Lea, NM	0	0		0	0.0	
Quay, NM	52	1.2		19	0.4	
Roosevelt, NM[2]	297	5.2		28	0.5	
Union, NM	33	1.7		13	0.2	
Overall Alternative	1,303	1.3		141	0.1	

3930-2

No impact. (Less than 10 housing units and less than 1.0% of the county housing stock.)

Low impact (10-20 housing units or greater than 1.0% of the county housing stock.)

Moderate impact. (20-50 housing units and less than 5.0% of the county housing stock.)

High impact. (50 or more housing units or greater than 5% of the county housing stock.)

[2]Conceptual location of Area Support Centers (ASCs).

Source: Individual state department of highway maps, Texas, 1979, and New Mexico, 1970.

slower and less efficient. Where this occurs, the government pays a lump sum settlement ("severance damage") for the resulting loss of value to the remaining farmland.

Land need not always be acquired in fee simple (ownership). Easements rather than fee, special conditions in fee purchases, and easements or leases back to the owner are also possible. The Air Force will try to accommodate a landowner as much as possible in order to allow existing farming and ranching activities to continue.

As noted above, QD zone easements could require removing some existing houses. The government will pay the fair market value of the house plus, where necessary, an additional amount (up to $15,000) for a comparable replacement dwelling which is decent, safe, sanitary, reasonably accessible to public services, and available on the private market. Closing costs and moving expenses are also paid on replacement dwellings. The government will pay the difference in interest rates between existing mortgages on replacement housing. Where economically and technically feasible, an existing house can be moved to a new location, if the owner so desires.

Farmers and ranchers receive additional expenses in connection with seeking a replacement farm and up to one year's farm income (in accordance with PL 91-646, not to exceed $10,000). Except on OB and ASC locations, no complete farm operations are expected to be displaced. An individual farmer or rancher may lose a small amount of land for shelters and road right-of-way, or may be required to move his house or build a new one (at government expense) outside the QD zone. The farm or ranching operation itself should not be so seriously affected, since irrigated and dry farming or ranching activities currently continue right up to the shelter fence in similar Minuteman shelter deployments.

The Air Force expects that most land easements will be acquired by agreement with the landowner. Condemnation (eminent domain) is legally available, but would be used only when attempts to negotiate an equitable purchase agreement were exhausted. "Friendly condemnations" are also entered into when the apparent owner is willing to sell but clear title cannot be conveyed, due to such complications as missing heirs.

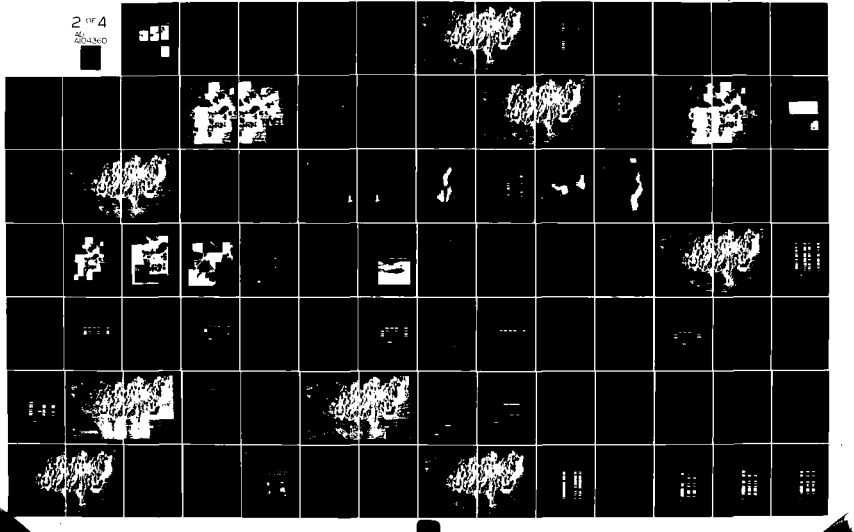
ALTERNATIVE 8 (4.3.2.12.2.10)

Under Alternative 8 split basing deployment, impacts in the Nevada/Utah region would be negligible.

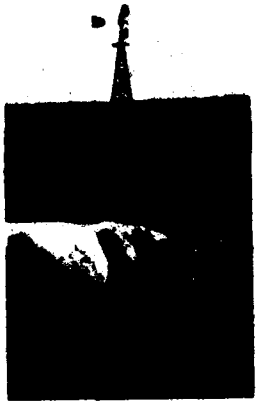
In the Texas/New Mexico region, a total of 141 residences may have to be relocated (Table 4.3.2.12-4). In Texas/New Mexico, Alternative 8 DDA facilities were selected from those in Alternative 7 to specifically minimize the number of homes directly affected. With Tier Two refinements in the cluster layouts, even these figures could be further reduced.

AD-A104 360 AIR FORCE SYSTEMS COMMAND WASHINGTON DC F/G 5/3
DRAFT ENVIRONMENTAL IMPACT STATEMENT, MX DEPLOYMENT AREA SELECT--ETC(U)
DEC 80
UNCLASSIFIED AFSC-TR-81-60 NL

2 OF 4
AD A104360



Grazing



GRAZING

INTRODUCTION (4.3.2.12.3.1)

Nevada/Utah

Agriculture in Nevada and Utah are geared primarily to the livestock industry. In Nevada it represents up to 75 percent of the dollar value. Western Utah has a more diversified agricultural economy because of water from the Wasatch Mountains, but livestock is still the predominant industry.

The two most common types of livestock operations are cow-calf and ewe-lamb. Marketed animals usually go to other states for additional fattening on rangelands, pasture, and/or feedlots. The limited cropland in Nevada and Utah is primarily used to raise feed to carry the base herd over the winter period.

Open range grazing is the most typical farm operation. Overall, about 79 percent of Nevada and 77 percent of Utah is grazed. In the mid 1970s, there were approximately 555,000 total animal units (each equal to one cow or five sheep) in Nevada and 764,000 in Utah (Council for Agricultural Science and Technology, 1974). Within the study area, there are a total of about 343,000 animal units, 122,000 (36 percent) in Utah and 221,000 (64 percent) in Nevada. For individual hydrologic subunits in the study area, animal units range from 1,900 to 24,000 for Utah and 150 to 16,000 for Nevada. Not all of these animal units utilize federal range. The concentration of livestock in each state is based on the average number of animal units present on each acre; the higher the number of animal units, the higher the concentration. In the Utah study area, about 70 acres are required per animal unit and in the Nevada study area, about 90 acres. Each animal unit is approximately equivalent to five animal unit months.

For impact analysis, total animal unit months (AUMs), each equal to one cow or five sheep grazing for one month, were estimated for each hydrologic subunit on the basis of BLM planning unit records for 1979. The proportion of units within boundaries of hydrologic subunits were used, along with the average acres per AUM for each planning unit. For a subset of the hydrologic subunits, the same procedure was followed on the bases of individual allotments, rather than planning units. The

average number of acres per AUM was determined for each hydrologic subunit from its total area in acres and total estimated AUMs. AUM loss figures were then determined by dividing the total area disturbed by the average number of acres per AUM.

Texas/New Mexico

In the Texas/New Mexico study area, grazing is the major land use. In the 20 affected counties, about 13 million acres, or about 60 percent of the total in the study area, are used for grazing and pasture land. Overall, about 86 percent of the land in the New Mexico counties and 73 percent of the land in the Texas counties is grazed. The major portion (75 percent) of the grazing land lies in New Mexico, almost entirely on private lands except in Chaves County, New Mexico, where the BLM administers certain lands, and in Dallam County, Texas, where National Grassland areas are managed by USFS. The affected counties also contain some of the bistate area's most highly productive cropland, which primarily supports feedlot operations.

In the mid-1970s, there were 13,988,000 animal units in Texas and 1,231,000 in New Mexico. Within the Texas/New Mexico study area, there are a total of about 2,018,000 animal units, 2,238,000 (61 percent) in Texas and 783,000 (39 percent) in New Mexico. Based on the total acreage in each state, each animal unit required about 12 acres in Texas and 63 acres in New Mexico (Council for Agricultural Science and Technology, 1974).

Livestock concentration in the study area is 7 acres per animal unit in Texas and 25 acres per animal unit in New Mexico, compared to 90 and 70 acres per animal unit in Nevada and Utah, respectively. The greater density of animal units compared to Nevada/Utah, where cow-calf and ewe-lamb operations predominate, reflects the large numbers of livestock in Texas/New Mexico stockyards (feedlots) where they are finished out prior to slaughter. About 10 percent of all cattle in the New Mexico study area are fed annually in feedlots. For Texas the figure is about 75 percent.

Impact analysis for Texas/New Mexico followed a procedure similar to that used for Nevada/Utah. County agricultural statistics for 1974 were converted to animal units, and the total number of animal units and average animal unit concentration were computed. Potential animal unit losses were estimated by dividing the total area disturbed in each county by the average number of acres per animal unit.

For split basing, the disturbance figures provided for full basing were adjusted in proportion to the decrease in the number of shelters in each hydrologic subunit (Nevada/Utah) or county (Texas/New Mexico). For most of the hydrologic subunits or counties used for both alternatives, the level of disturbance is the same.

PROPOSED ACTION (4.3.2.12.3.2)

Under the Proposed Action, nearly all of the M-X system is sited on Nevada/Utah rangeland (see Irrigated Cropland and Managed Grazing Lands, (Figure 4.3.2.12-1). Impacts to rangeland are primarily through the loss of forage from direct disturbance of vegetation.

DDA Impacts

Potentially impacted grazing lands include creosote bush scrub, alkali sink scrub, shadscale, Great Basin sagebrush, and pinyon-juniper woodland vegetation types, which support large populations of livestock, feral horses and burros, and native large herbivores. Of these vegetation types, sagebrush and shadscale would be the most affected.

The potential for livestock reduction resulting from vegetation loss depends on the number of AUMs of current use and the concentration of use (acres per AUM). Hydrologic subunits with low concentrated use will be less severely impacted for each acre of vegetation disturbed than those with high concentrated use. All the hydrologic subunits in the proposed M-X deployment area were listed in order of decreasing number of AUMs per acre (decreasing concentration of use). A similar list was made for decreasing total number of AUMs. Highly productive hydrologic subunits occur in the north-central protion of Nevada and along the central portion of the Utah/Nevada border (Figure 4.3.2.12-10). Both areas represent generally higher elevation, wetter, and more productive areas of the Great Basin.

While total use and level of concentration are good indicators of an area's importance to the livestock industry, some areas with low total use or concentration provide forage during seasons when other sources may not be available or usable (Holmgren and Hutchings, 1972), and they may be vital for the continued operation of ranches that depend on them (U.S.D.I., Bureau of Land Management, 1979, 1980). Project-related loss of forage area could also result in the overgrazing of other areas, degrading those rangelands and encouraging the spread of alien annuals such as Halogeton glomeratus. Relatively small livestock reductions resulting from project impacts could force some ranching operations out of business.

Loss of grazing capacity through vegetation disturbance will be proportional to the level of construction activity and will peak at the completion of the project. The project also will impact various vegetation and range types in proportion to their occurrence with an approximate loss of 7,200 AUMs, or about 0.70 percent of the total in the hydrologic subunits. Sixty-eight percent of the loss would be in Nevada and 32 percent in Utah. In individual hydrologic subunits, estimated AUM losses would range about 0.1 percent to 2.0 percent.

High AUM concentrations occur in 26 percent of the affected subunits, which contain about 26 percent of the land area disturbed and would receive 35 percent of the AUM loss. Medium AUM concentrations occur in 34 percent of the impacted subunits, which contain 40 percent of the area disturbed and would receive 42 percent of the total AUM loss. The remaining area, with a low ranking of AUM concentration, contains 34 percent of the area disturbed and receives 23 percent of the AUM loss.

Hydrologic subunits with medium AUM concentration receive the highest concentration of deployment area facilities. Total AUMs lost and the percentage of the total for each subunit are the highest in the medium-concentration subunits (3,000 AUMs, 0.94 percent), intermediate in those with high concentrations (2,500 AUMs, 0.64 percent), and lowest in those with low concentrations (1,700 AUMs, 0.59 percent). Over the entire project area, non-M-X projects contribute little to changes in AUM levels.

Relatively small impacts are anticipated to result from the construction of support and construction roads, area support centers, remote surveillance sites, power transmission corridors, and command, control and communications networks. Site-specific location and disturbance data are not yet available.

Recovery of Great Basin vegetation is slow under optimum conditions and will be even slower, perhaps prevented entirely, if disturbed areas are grazed before sufficient recovery has occurred. The initial disturbance, together with continued disturbance from grazing by domestic and feral livestock and by wildlife, would encourage the spread of such poisonous annual plants as halogeton. These species can persist for extended periods of time, not only preventing the reestablishment of the former grazing capacity but also restricting the use of adjacent undisturbed areas.

In general, the livestock industry in the Nevada/Utah area operates on a narrow profit margin. For some ranchers, short-term impacts of the M-X system could be difficult to survive. Other operators will benefit from increased availability of water resources. Impacts are not uniform over a hydrologic subunit, and livestock operators dependent on impacted areas could be significantly affected.

All the ranches in the study area have been categorized by the type of livestock and grazing management systems used and the economic effects of impacts for each planning unit are being analyzed by means of linear programming techniques. Preliminary results indicate that the economic losses to livestock operations from indirect effects such as inflated operating costs and increased animal deaths could be several times the economic loss resulting from lost grazing capacity.

Grazing management is the effective use of the grazing capacity of an allotment. Many types of range improvements are necessary to accomplish the proper utilization of the grazing resource by livestock. Most of these are associated with various types of agreements and commitments between management agencies and private users. Water developments providing livestock drinking water are of critical importance in much of the Nevada/Utah area. About 10 to 15 percent of the area is currently ungrazed because of the lack of water. Cattle will generally not graze further than about 4 mi from drinking water. The loss of a water site can mean the loss of up to 50 mi^2 of grazing land. A loss of one site in a hydrologic subunit can mean several times the AUM loss from direct vegetation disturbance by the project. The widespread nature of the project and its potential for groundwater drawdown could result in the loss of some livestock watering sites.

An important element of grazing management is fencing, which controls both the management of forage by livestock within allotments and separates allotments leased by different operators. The extensive road system for M-X will cause numerous breaks in existing fencing, particularly during construction when uncompleted roads will have continuous use. If practical ways cannot be found to prevent livestock from moving through these gaps, use of the affected allotments may have to be curtailed or some type of agreement reached between permit holders. Cluster locations may require realignment of allotment boundaries, many of which are based on historic commitments that will need to be addressed.

Impact data for affected hydrologic subunits in Nevada/Utah are summarized in Table 4.3.2.12-5. Under the Proposed Action, the M-X system is constructed

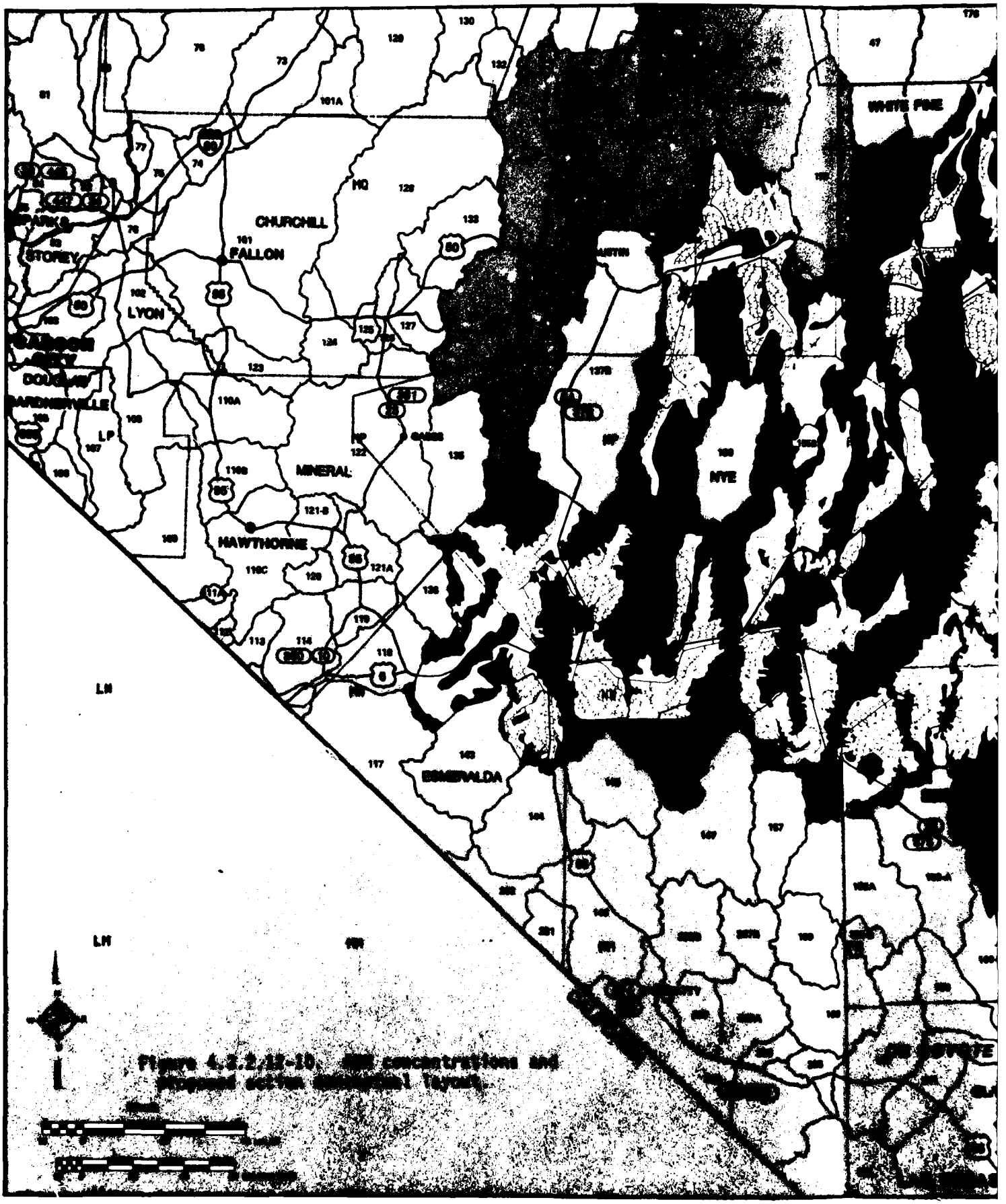
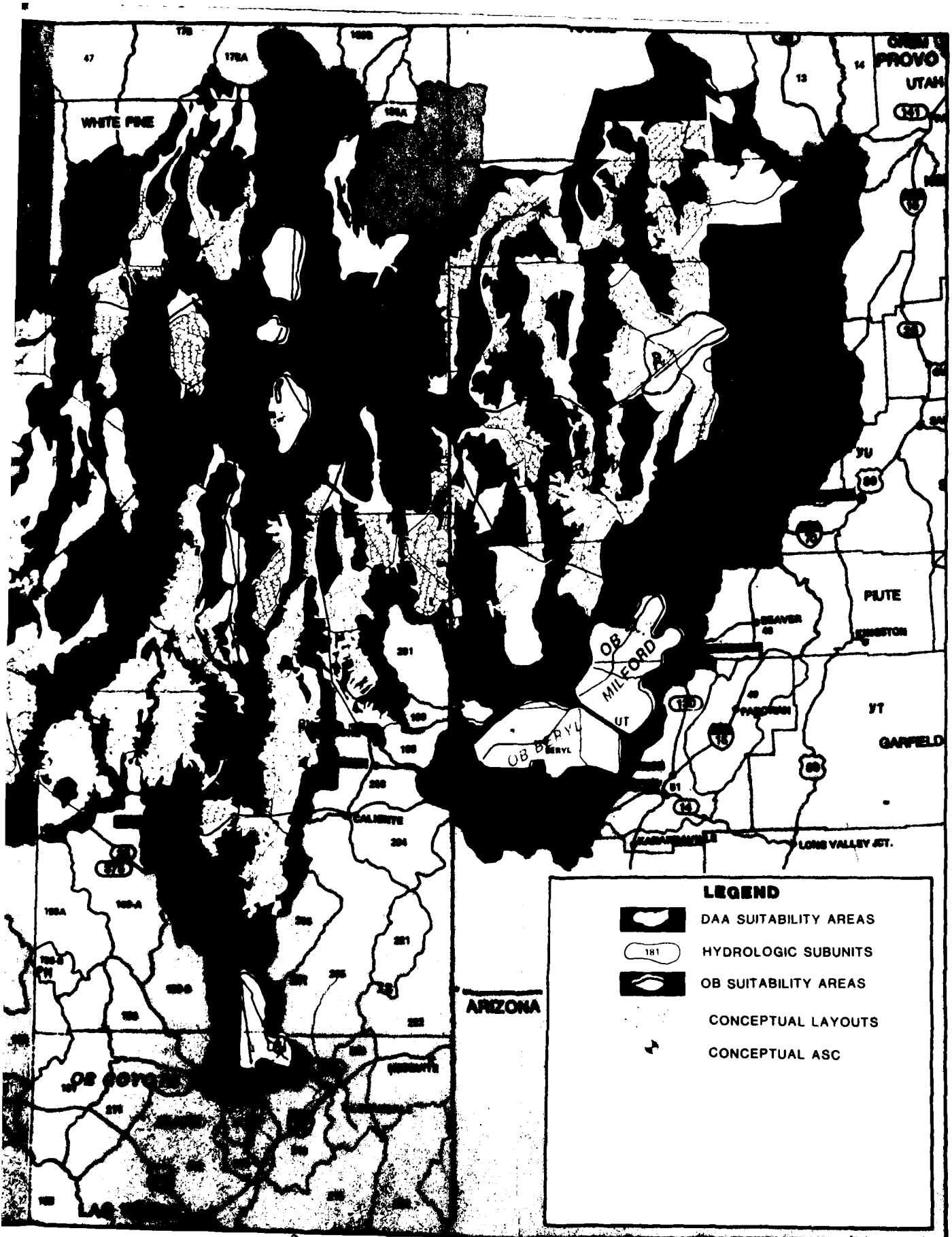


Figure 4.2.2.12-10. [illegible] concentrations and proposed action alternative layout.


WHITE PINE
PROVO
UTAH
PIUTE
GARFIELD
OB MILFORD UT
OB BERYL
LONG VALLEY JCT.
ARIZONA
LEGEND
DAA SUITABILITY AREAS
181
HYDROLOGIC SUBUNITS
OB SUITABILITY AREAS
CONCEPTUAL LAYOUTS
CONCEPTUAL ASC

3222-D

Table 4.3.2.12-5. Potential direct impact to grazing as a result of M-X DDA construction in Nevada/Utah for Proposed Action and Alternatives 1-6.

HYDROLOGIC SUBUNIT AREA		AUM CONCENTRATION IN AREA[1]	SHORT-TERM AND LONG-TERM EFFECTS		
NO.	NAME		ESTIMATED AUM LOSS	LOSS AS % OF TOTAL AUMS IN AREA	POTENTIAL IMPACT[1]
	Subunits with M-X Clusters and DTN				
4	Snake		636	0.2	
5	Pine		225	0.9	
6	White		215	0.8	
7	Fish Springs		78	0.6	
8	Dugway		111	1.1	
9	Government Creek		23	0.2	
46	Sevier Desert		277	0.3	
46A	Sevier Desert-Dry Lake[2]		404	1.4	
54	Wah Wah		329	1.5	
137A	Big Smoky-Tonopah Flat		87	0.4	
139	Kobeh		335	1.0	
140A	Monitor—Northern		216	2.5	
140B	Monitor—Southern		18	0.2	
141	Ralston		262	1.5	
142	Alkali Spring		44	1.7	
148	Cactus Flat		10	0.4	
149	Stone Cabin[4]		132	0.8	
151	Antelope		226	1.9	
154	Newark[3]		175	0.5	
155A	Little Smoky—Northern		139	1.0	
155C	Little Smoky—Southern		105	0.6	
156	Hot Creek		202	0.7	
170	Penoyer		108	1.1	
171	Coal		179	1.2	
172	Garden		128	1.5	
173A	Railroad—Southern		162	1.2	
173B	Railroad—Northern		271	0.6	
174	Jakes[2]		334	2.0	
175	Long		186	0.3	
178B	Butte—South		208	0.7	
179	Steptoe		19	0.1	
180	Cave		140	1.0	
181	Dry Lake[2]		397	1.3	
182	Delamar		82	0.8	
183	Lake		142	0.9	
184	Spring		128	0.2	
196	Hamlin		250	0.9	
202	Patterson		20	0.2	
207	White River		250	0.5	
208	Pahroc		11	0.1	
209	Pahranagat		23	0.1	
	Overall DDA Impact		7,187	0.7	

[1]

3833-3

No AUM reduction (No AUM concentration).

Low - Moderately Low Impact (Low AUM Concentration). Projected AUM reductions representing less than 1 percent of AUMs in the hydrologic subunit or totalling less than 200 AUMs.

Moderate - Moderately High Impact (Moderate AUM Concentrations). Projected AUM reductions representing 1-5 percent of AUMs in the hydrologic subunit or totalling 200-500 AUMs.

High Impact (High AUM Concentrations). Projected AUM reductions representing 5 percent or more of those in the hydrologic subunit or totalling 500 or more AUMs.

[2]Conceptual location of Area Support Center (ASC).

almost entirely on grazing land and all types of impacts to this resource, therefore, generally are unavoidable. Although the area directly impacted is relatively small, the geometric pattern of the project makes the impact pervasive over a wide area. In some instances, the project covers essentially the entire subunit floor, a fact that can have serious implications for operations involving livestock, particularly sheep. The project disturbance could result, for example, in a checkerboard pattern in the distribution of halogeton. When forage and drinking water have been limited, sheep will consume toxic quantities of halogeton if it is available after drinking water has been obtained. Under these circumstances, profitable grazing requires a sufficient area that is reasonably free of halogeton. Undisturbed areas within the project layout would generally be too small for this purpose.

Mitigation measures include avoidance of highly productive areas, provision of additional water supplies, reimbursement for losses or supplemental feed, and improvement of range productivity. Of these, the most effective would be avoidance through system design of the most productive (highest AUM concentration) hydrologic subunits and the most productive allotments within utilized subunits when possible. Supplying additional water resources to improve livestock utilization of areas not affected by the project could also be used to mitigate losses. In some instances, reimbursement for losses or provision of supplemental feed could be used to compensate for short-term losses. A longer term mitigation is the improvement of range productivity in areas adjacent to those impacted by the project. Establishment of improved vegetation, however, would require several years and controlled use by grazing animals.

Coyote Spring Valley OB Impacts

The Coyote Spring Valley OB is located in an area with a low AUM concentration. Operating base impacts to grazing occur about equally within two allotments (Delamar and Arrow Canyon). The Arrow Canyon allotment is currently ungrazed so losses will be to future uses. A total loss of about 153 AUMs could result, and this level would not vary significantly with the location of base facilities within the suitable area (Table 4.3.2.12-6).

The loss of AUMs from direct vegetation disturbance will peak on completion of the OB and remain at that level through decommissioning. Grazing restrictions in the OB vicinity will increase the total potential AUM loss. Additional disturbance will result from DTN construction through the Coyote Spring and Pahranagat hydrologic subunits to connect the OB with Delamar Valley.

The significance of the AUM losses will depend on the importance of the Delamar and Arrow Canyon allotments to the viability of local livestock operations and on how the disturbance alters the BLM grazing management plans for the region. Because of the aridity of the region, there is limited opportunity for mitigating AUM losses associated with OB construction and operation. Compensation is one mitigative measure that could be taken.

Milford OB Impacts

The Milford OB, second OB for the Proposed Action, is located in a hydrologic subunit with a high AUM concentration on public land (Cook and Antelope Peak allotments), and privately held irrigated pasture. Based on the average AUM

Table 4.3.2.12-6. Potential direct impact to grazing from area disturbed by construction of operating bases for the Proposed Action and Alternatives 1-6, and 8 (Coyote Spring Valley). (page 1 of 2)

ALTERNATIVE	LOCATION	ESTIMATED AUM LOSS	LOSS AS % OF HYDROLOGIC SUBUNIT TOTAL AUMS	POTENTIAL OVERALL IMPACT[1]
Proposed Action	Coyote Spring Valley, NV	153	2.5	
	Milford, UT	248	0.5	
Alternative 1	Coyote Spring Valley, NV	153	2.5	
	Beryl, UT	212	0.7	
Alternative 2	Coyote Spring Valley, NV	153	2.5	
	Delta, UT	208	0.2	
Alternative 3	Beryl, UT	307	1.0	
	Ely, NV	176	0.4	
Alternative 4	Beryl, UT	307	1.0	
	Coyote Spring Valley, NV	106	1.7	
Alternative 5	Milford, UT	359	0.7	
	Ely, NV	176	0.4	
Alternative 6	Milford, UT	359	0.7	
	Coyote Spring Valley, NV	106	1.7	
Alternative 8	Coyote Spring Valley, NV	153	2.5	

3834-2

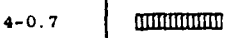
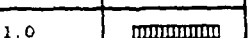
[1] No AUM reduction.

Low impact. Projected AUM reductions representing less than 1 percent of AUMs in the hydrologic subunit or totalling less than 200 AUMs.

Moderate impact. Projected AUM reductions representing 1-5 percent of AUMs in the hydrologic subunit or totalling 200-500 AUMs.

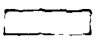
High Impact. Projected AUM reductions representing 5 percent or more of those in the hydrologic subunit or totalling 500 or more AUMs.

Table 4.3.2.12-6. Potential direct impact to grazing from area disturbed by construction of operating bases for the Proposed Action and Alternatives 1-6, and 8 (Coyote Spring Valley). (page 2 of 2)

ALTERNATIVE	LOCATION	ESTIMATED ANIMAL UNIT LOSS	LOSS AS % OF TOTAL COUNTY ANIMAL UNITS	POTENTIAL IMPACT[1]
Alternative 7	Clovis, NM Dalhart, TX	470-800	0.4-0.7	
Alternative 8	Clovis, NM	900	1.0	

3834-2

[1]

 No animal unit reductions.

 Low impact. Projected AUM reductions representing less than 1 percent of AUMs in the hydrologic subunit or totalling less than 200 AUMs.

 Moderate impact. Projected AUM reductions representing 1-5 percent of AUMs in the hydrologic subunit or totalling 200-500 AUMs.

 High Impact potential. Projected animal unit reductions representing 5 percent or more of the animal units in the county or totalling more than 1,000 animal units.

Note: "animal units" and "AUM" (animal unit months) are not equivalent; they represent different data sets.

concentration, OB construction and operation is expected to result in the loss of about 248 AUMs, although this level could vary significantly within the suitability envelope depending on the mix of public and private land (Table 4.3.2.12-6).

The loss of AUMs will peak on completion of the OB and will remain at that level through decommissioning. Grazing restrictions in the vicinity of the base will increase total AUM loss. Mitigation measures include avoidance of the more productive areas, particularly on private land; range improvement projects on adjacent, undisturbed areas; and AUM loss compensation and/or provision of supplemental feed.

ALTERNATIVE 1 (4.3.2.12.3.3)

Impacts in the DDA and at the Coyote Spring are the same as those for the Proposed Action.

The Beryl OB, second OB for Alternative 1, is located in a hydrologic subunit with medium AUM concentration. The facilities for this OB occupy parts of four allotments: Tilly Creek, Bennion Springs, Del Vecchio, and Mule Springs. Total losses from direct vegetation disturbance in the four allotments will be about 212 AUMs (Table 4.3.2.12-6). The loss of grazing capacity from vegetation disturbance will not significantly vary with the location of base facilities within the suitable area.

AUM losses will peak with the completion of the base and will remain at that level through decommissioning. Grazing restrictions in the vicinity of the OB will increase the total AUM loss. The grazing losses associated with the establishment of the Beryl OB could significantly affect the viability of operations dependent on the impacted allotments.

Mitigation measures include avoidance of the more productive areas; rangeland improvement projects in undisturbed areas of the affected allotments; and compensation and/or provision of supplemental feed, particularly during construction.

ALTERNATIVE 2 (4.3.2.12.3.4)

Impacts in the DDA and at Coyote Spring OB are the same as those for the Proposed Action. The Delta OB, second OB for Alternative 2, is located in a hydrologic subunit with medium AUM concentration. The OB facilities are located in a single allotment (Desert). Total grazing losses from direct vegetation disturbance will be about 208 AUMs and will not vary significantly with the location of facilities within the suitable area (Table 4.3.2.12-6).

Grazing losses will peak with the completion of the base and will remain at that level through decommissioning. Grazing restrictions in the vicinity of the OB will increase the total AUM loss. The significance of AUM losses will depend on the importance of the affected portions of the Desert allotment to the viability of local livestock operations.

Mitigation measures include avoidance of the more productive areas of the Desert allotment; rangeland improvement projects in undisturbed areas of the allotment; and provision of supplemental feed through the construction phase and the period required for establishment of improved rangeland.

ALTERNATIVE 3 (4.3.2.12.3.5)

DDA Impacts in the DDA are the same as those for the Proposed Action. Alternative 3 proposes a first OB at Beryl, thus adding the DAA and OBTS system components to the Beryl OB configuration discussed under Alternative 1. The additional construction work will increase the estimated direct AUM losses from 212 to 370 AUMs (Table 4.3.2.12-6). The level of grazing loss probably will not vary significantly with the location of base facilities within the suitability envelope. Additional losses also will result from DTN construction through Pine Valley to connect the OB to the DDA. Impact significance and potential mitigation measures are generally the same as those for the Beryl second OB (Alternative 1).

The Ely operating base is located in the Steptoe hydrologic subunit, which has a low concentration of AUMs. The facilities for this base are located in the Tamberlain, Little White Rock, and West Schell Bench allotments. Total losses from direct vegetation disturbance will be about 176 AUMs (Table 4.3.2.12-6) and probably will not vary significantly with the location of base facilities within the suitability zone.

Grazing losses will peak at completion of OB construction and will remain at that level through decommissioning. Grazing restrictions in the vicinity of the base will increase the total AUM loss. The significance of the grazing losses will depend on the importance of the affected allotments to the viability of local livestock operations.

Mitigative measures include avoidance of the more productive areas of the affected allotments, rangeland improvement projects in undisturbed areas; and provision of supplemental feed through the construction phase and the period required for establishment of improved rangeland.

ALTERNATIVE 4 (4.3.2.12.3.6)

Impacts in the DDA are the same as those for the Proposed Action and impacts at the Beryl OB are the same as those for Alternative 3. Impacts at the Coyote Spring OB are the same as those for the Proposed Action except that estimated grazing losses are reduced from 153 to 106 AUMs (Table 4.3.2.12-6).

ALTERNATIVE 5 (4.3.2.12.3.7)

Impacts in the DDA are identical with those for the Proposed Action. Impacts at the Milford OB are the same as those for the Proposed Action except that estimated grazing losses increase from 248 to 359 AUMs (Table 4.3.2.12-6). Additional disturbance will include the DTN construction from the OB to the DDA in Wah Wah Valley. Impacts at the Ely OB are the same as those for Alternative 3.

ALTERNATIVE 6 (4.3.2.12.3.8)

Impacts in the DDA are the same as those for the Proposed Action and those of the first OB are the same as for Alternative 5.

Impacts on Coyote Spring second OB are the same as those discussed for Alternative 4.

ALTERNATIVE 7 (4.3.2.12.3.9)

Under Alternative 7, the DDA is primarily in Texas/New Mexico and that supports the livestock industry (Figure 4.3.2.12-6). In New Mexico, most of the impacted land is rangeland; in Texas, most of it is cropland. The study area comprises a complex association of native rangeland, irrigated pasture, and feedlots.

DDA Impacts

Construction disturbance would affect each livestock support area in direct proportion to its relative abundance in each county. Based on these assumptions, up to 14,800 animal units, or about 0.65 percent of the total present in the affected counties, would be lost. The animal unit losses in the individual counties vary from about 0.1 to 1.65 percent of the total present. Texas has 65 percent of the total animal units in the affected counties and would sustain about 74 percent of the loss. In Nevada and Utah, each AUM is equivalent to about 0.21 animal units, while in New Mexico, each animal unit is equivalent to about 6.2 AUMs. The full basing loss of animal units in Texas/New Mexico is over twice the loss of AUMs in the Nevada/Utah area. In economic terms, the impact is about 10 times larger.

The concentration of livestock in a county is a good single indicator of sensitivity to impact. There is a much higher concentration of stockyards in Texas, which contains all the study area counties with high animal unit concentrations, all but two of the counties with medium concentrations, and only one with low concentrations. The rest of the low concentration counties are in New Mexico (Figure 4.3.2.12-11).

Twenty-six percent of the counties potentially impacted by Alternative 7 are high-ranked counties, which account for 20 percent of the total land area potentially disturbed and 49 percent of the total potential animal unit loss. Thirty-seven percent of the affected counties are medium-ranked counties, which account for 42 percent of the total area disturbed and 33 percent of the total potential animal units lost. The remaining counties have low animal unit concentrations. The percentage of the possible animal units lost in each county, relative to the total number in each, was highest in the high concentration counties (7,100 animal units, 0.92 percent), intermediate in the medium concentration counties (4,800 animal units, 0.78 percent), and lowest in the low concentration counties (2,700 animal units, 0.48 percent). In Nevada/Utah, on the other hand, the higher percentage of project disturbance occurs in hydrologic subunits having medium animal unit concentrations.

An important requirement for the livestock industry that would compete with M-X is the continued availability of water for cropland irrigation. The Ogalalla basin supplies irrigation water to the high plains region of Texas and New Mexico.

The water table is decreasing an average of 2 ft a year in many areas, and up to 8 ft during some years. As overdrafting diminishes the yield from wells, marginal irrigated croplands in some study area counties are being converted to dryland agriculture or abandoned as cropland. Many of these irrigated croplands have produced livestock feed, which must be replaced by dryland crops or by forage shipped in from other areas, or the numbers of livestock it supports will have to be reduced.

Relatively small impacts are expected to result from the construction of support roads, construction roads, area support centers, remote surveillance sites, power transmission corridors, and command, control, and communication networks. Site-specific location and disturbance data are not yet available.

The loss of livestock capacity through the disturbance of rangeland and cropland supporting livestock will be directly proportional to the level of construction activity and will peak at the completion of the project. Recovery will be potentially rapid compared to that expected in the Great Basin, with time measured in years rather than decades. Because of its inherent value, cropland will probably be renovated relatively rapidly. Some care will be needed to prevent the invasion of toxic weeds into grazed areas.

The grazing impact data for the affected Texas/New Mexico counties are summarized in Table 4.3.2.12-7.

Under Alternative 7, the M-X system would be constructed almost entirely on productive livestock support areas, and impacts to these resources generally are unavoidable. The livestock industry is the primary source of economic return in the Texas/New Mexico study area. The impacts resulting from both the direct project disturbance and the restrictions to movement during and immediately following construction could substantially impact some individuals and livestock operations. The total livestock losses in this region could exceed $1.5 million per year during the peak years of disturbances. The segment of the economy on which these losses will be focused will be significantly impacted. These figures are in addition to any losses accrued from the disturbance of croplands.

The impact of the project on livestock production could be reduced substantially by the avoidance of feedlots. Losses in some Texas counties could be reduced by as much as 75 percent and in some New Mexico counties by over 30 percent.

Avoidance of the most productive areas of rangeland and cropland used primarily to raise livestock feed could also reduce losses.

Clovis OB Impacts

The Clovis first OB is located in Curry County, which has a medium concentration of animal units. The OB site is largely agricultural and contains feedlots supporting over 40 percent of the livestock in the county. Livestock losses would vary from about 470 to 800 or more, depending on whether feedlots are impacted. Animal unit losses will peak with OB completion and will remain at that level through decommissioning. The DTN will be routed along existing county roads and therefore will result in few if any losses. Impacts to livestock will be significant for the livestock operations directly affected. Because the surrounding area is fully utilized by existing livestock and agricultural enterprises, mitigation of lost area by some form of replacement will probably not be possible. Compensation of affected operations could be used as a mitigating measure.


COLORADO
KS
OKLAHOM
TEXAS
RIO ARRIBA
SANTA FE
SAN MIGUEL
DEAF SMITH
HANSF
DALHAM
OLFAX

Table 4.3.2.12-7. Potential direct impact to grazing as a result of M-X DDA construction in Texas/New Mexico for Alternative 7.

COUNTY	ANIMAL UNIT CONCENTRATION IN COUNTY[1]	ESTIMATED ANIMAL UNIT LOSS	LOSS AS % OF COUNTY TOTAL ANIMAL UNITS	POTENTIAL IMPACT[1]
Counties with M-X Clusters and DTN				
Bailey, TX		317	0.7	
Castro, TX		1,210	0.6	
Cochran, TX		144	0.5	
Dallam, TX		1,840	2.0	
Deaf Smith, TX[2]		3,723	1.6	
Hartley, TX[2]		1,188	1.1	
Hockley, TX		5	0.1	
Lamb, TX		122	0.3	
Oldham, TX		122	0.2	
Parmer, TX		1,833	1.2	
Randall, TX		221	0.2	
Sherman, TX		109	0.1	
Swisher, TX		270	0.2	
Chaves, NM		598	0.4	
Curry, NM		739	0.8	
DeBaca, NM		34	0.1	
Guadalupe, NM		5	0.1	
Harding, NM		169	0.4	
Lea, NM		17	0.1	
Quay, NM		701	0.8	
Roosevelt, NM[2]		1,026	1.1	
Union, NM		454	0.3	
Overall DDA Impact		14,847	0.7	

3835-2

[1]

No animal unit reductions (No Animal Unit Concentration).

Low Impact. (Low Animal Unit Concentration). Projected animal unit reductions representing less than 1 percent of those in the county or totalling less than 500 animal units.

Moderate Impact. (Moderate Animal Unit Concentration). Projected animal unit reductions representing less than 5 percent of those in the county or totalling 500-1,000 animal units.

High Impact (High Animal Unit Concentration). Projected animal unit reductions representing 5 percent or more of the animal units in the county or totalling more than 1,000 units.

[2]Conceptual location of Area Support Centers (ASCs).

Note: "Animal Units" and "AUM" (animal unit months) are not equivalent, they represent different data sets.

Dalhart OB Impacts

The Dalhart operating base is located in Hartley County, southwest of Dalhart, Texas. This county has a medium animal unit concentration and contains extensive rangeland, as well as cropland and feedlots. Losses from the placement of this base could reach 900 or more animal units, depending on the types of livestock facilities impacted.

Animal unit losses will peak with OB completion and will remain at that level through decommissioning. Losses will be significant for the livestock operations directly impacted. Rangeland improvements in the surrounding area could mitigate some losses. Compensation is also a mitigation that could be used.

ALTERNATIVE 8 (4.3.2.12.3.10)

DDA Impacts

Nevada/Utah

The DTN, cluster roads, and shelters for split basing will impact the various vegetation and range types in the hydrologic subunits in proportion to their occurrence (Figure 4.3.2.12-12). The approximate loss will be about 3,650 AUMs, or 0.55 percent of the total in all the affected subunits (Table 4.3.2.12-8). Fifty-three percent of the loss would be in Nevada and 42 percent in Utah. The estimated AUM losses in the individual subunits range from 0.02 percent to 1.29 percent. Other indirect losses are also possible.

Twenty-three percent of the impacted subunits have a high AUM concentration ranking and contain 22 percent of the land area disturbed and 29 percent of AUM loss. This is a 50 percent reduction compared with the Proposed Action. Subunits with intermediate AUM concentrations account for 41 percent of the impacted subunits and contain 50 percent of the area disturbed and 51 percent of the total AUM loss. This is a 25 percent reduction compared with the Proposed Action. The remaining impacted subunits have low AUM concentrations, 28 percent of the area disturbed, and 20 percent of the AUM loss, a 47 percent reduction compared to the proposed action. As with the proposed action, the hydrologic subunits with intermediate AUM concentrations receive the highest density of DDA facilities. The percentage of the total AUMs lost, relative to the total in each subunit is the highest in the intermediate-concentration subunits (1,850 AUMs, 0.70 percent), lowest in the high-concentration subunits (1,050 AUMs, 0.41 percent), and intermediate in the low-concentration (750 AUMs, 0.49 percent). The split basing alternative removes the project from more subunits with high and low concentrations than from those with intermediate concentrations.

Additional, relatively small losses of vegetation and grazing capacity will result from the construction of support roads, construction roads, area support centers, remote surveillance sites, power transmission corridors, and command, control and communications networks. Site specific location and disturbance data are not yet available.

Texas/New Mexico

Split basing eliminates all but one of the Texas counties with high animal unit concentrations (Figure 4.3.2.12-13) and reduces animal unit losses by 71 percent compared to Alternative 7 (Table 4.3.2.12-8). Project size reductions in several New Mexico counties reduce animal unit losses there by 35 percent compared to Alternative 7.

Only 7 percent of the counties potentially impacted by this alternative are high-ranked counties, a reduction of 80 percent compared to Alternative 7. These high-ranked counties account for 9 percent of the total land area potentially disturbed and 26 percent of the total potential animal loss. Forty-four percent of the impacted counties have medium animal unit concentrations and account for the 34 percent of the total area disturbed and 41 percent of the animal units potentially lost. The remainder is in counties with a low animal unit concentration ranking. The percentage of the possible animals lost in each county was highest in the high concentration counties (1,500 animal units, 0.64 percent), intermediate in the medium concentration counties (2,300 animal units, 0.37 percent), and lowest in the low concentration counties (1,900 animal units, 0.33 percent). This differs from the results for the individual hydrologic subunits of Nevada and Utah where the highest project concentration occurs in the subunits with medium concentrations.

Relatively small animal unit losses will result from the construction of support roads, construction roads, area support centers, remote surveillance sites, power transmission corridors, and command, control, and communication networks. Site-specific location and disturbance data are not yet available.

Coyote OB Impacts

Impacts are identical to those for the Proposed Action.

Clovis OB Impacts

Impacts the same as those for Alternative 7.

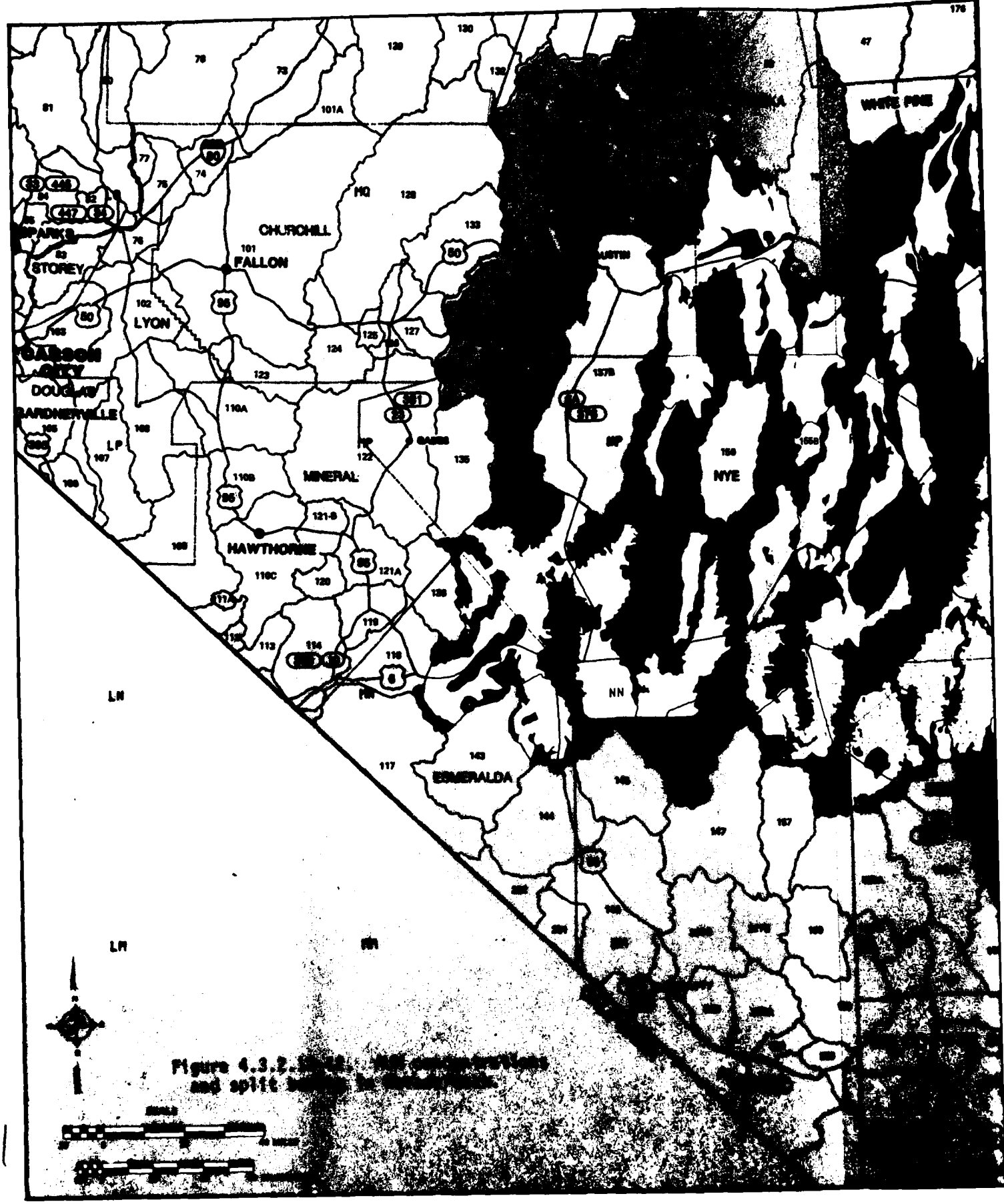
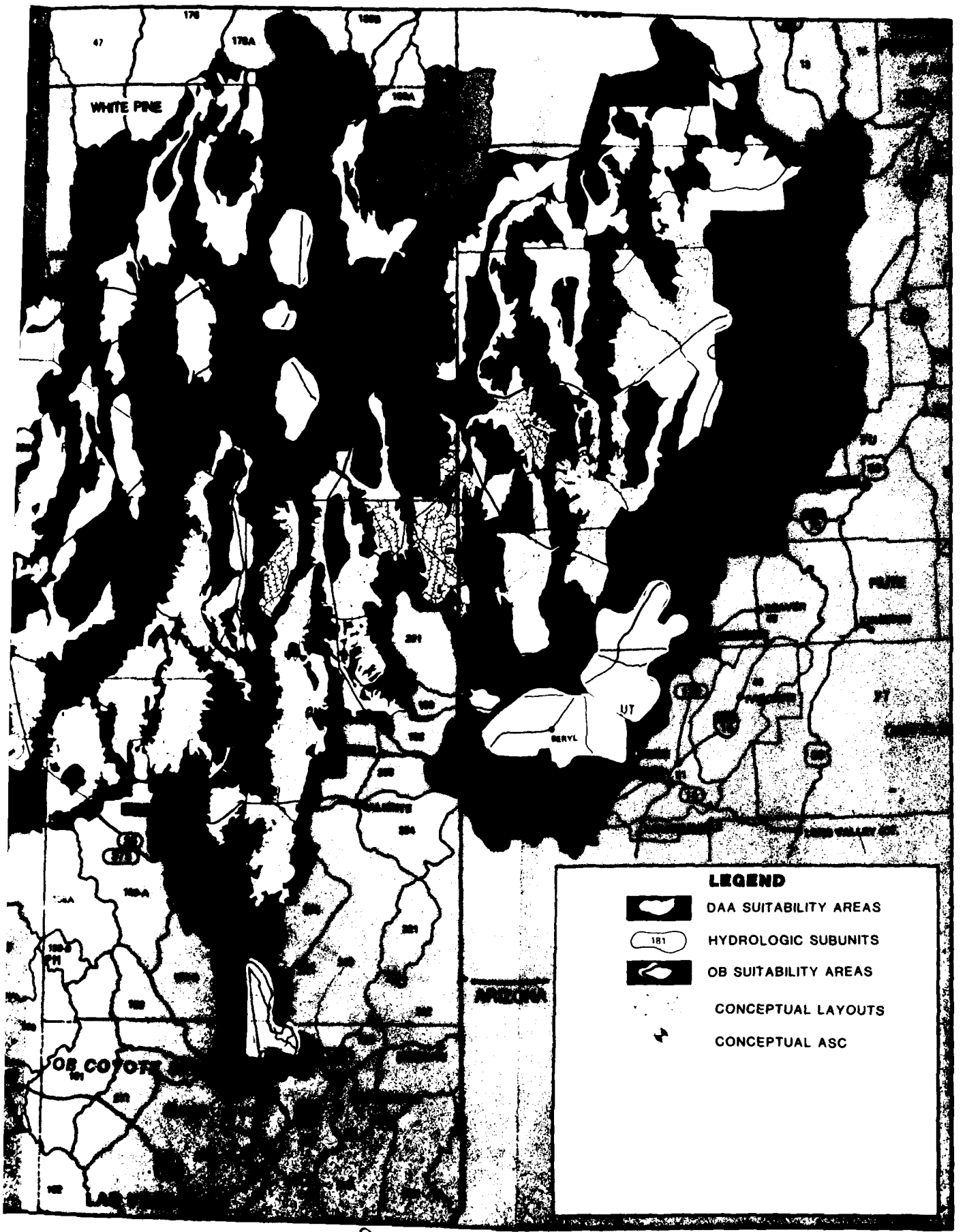


Figure 4.3.2. [illegible] and split [illegible]


WHITE PINE
UT
BERYL
ARIZONA
OB COYOTE
LEGEND
DAA SUITABILITY AREAS
181
HYDROLOGIC SUBUNITS
OB SUITABILITY AREAS
CONCEPTUAL LAYOUTS
CONCEPTUAL ASC

3222-D

Table 4.3.2.12-8. Potential direct impact to grazing as a result of DDA construction in Nevada/Utah and Texas/ New Mexico for Alternative 8 (split basing).

HYDROLOGIC SUBUNIT NO.	HYDROLOGIC SUBUNIT NAME	AUM CONCENTRATION IN THE AREA[1]	SHORT-TERM AND LONG-TERM EFFECTS: ESTIMATED AUM LOSS	LOSS AS % OF TOTAL AUMS IN AREA	POTENTIAL IMPACT[1]
	Subunits or Counties with M-X Clusters and DTNs				
4	Snake[2]		274	0.3	
5	Pine		225	0.9	
6	White		215	0.8	
7	Fish Springs		3	0.1	
46	Sevier Desert		160	0.5	
46A	Sevier Desert & Dry Lake[3]		186	0.2	
54	Wah Wah		277	0.3	
155C	Little Smoky—Southern		69	0.4	
156	Hot Creek		180	0.6	
170	Penoyer		108	1.1	
171	Coal[3]		179	1.2	
172	Garden		128	1.5	
173A	Railroad—Southern		131	1.0	
173B	Railroad—Northern		78	0.2	
180	Cave		140	1.0	
181	Dry Lake[3]		397	1.3	
182	Delamar		82	0.8	
183	Lake		142	0.9	
184	Spring		128	0.2	
196	Hamlin		250	0.9	
202	Patterson		20	0.2	
207	White River		250	0.5	
	COUNTY	ANIMAL UNIT[1] CONCENTRATION[2]	ESTIMATED ANIMAL UNIT LOSS	LOSS AS % OF TOTAL ANIMAL UNIT IN AREA	POTENTIAL IMPACT[1]
	Bailey, TX		14	0.1	
	Cochran, TX		126	0.4	
	Dallam, TX		510	0.6	
	Deaf Smith, TX		1,460	0.6	
	Hartley, TX[3]		967	0.9	
	Hockley, TX		5	0.1	
	Lamb, TX		11	0.1	
	Oldham, TX		74	0.1	
	Parmer, TX		10	0.1	
	Chaves, NM		598	0.4	
	Curry, NM		318	0.4	
	DeBaca, NM		29	0.1	
	Guadalupe, NM		5	0.1	
	Harding, NM		169	0.4	
	Lea, NM		17	0.1	
	Quay, NM[2]		525	0.6	
	Roosevelt, NM[2,3]		393	0.4	
	Union, NM		370	0.2	
	Other Affected Subunits				
208	Pahroc		11	0.1	
210	Coyote Spring		208	3.43	
	Overall Impact				

3836-4

'AUM' RELATED IMPACTS FOR NEVADA/UTAH

- No AUM reduction (no AUM concentration).
- Low - moderately low impact (low AUM concentration). Projected AUM reductions representing less than 1 percent of AUMs in the hydrologic subunit or totalling less than 200 AUMS.
- Moderate - moderately high impact (moderate AUM concentration). Projected AUM reductions representing 1-5 percent of AUMs in the hydrologic subunit or totalling 200-500 AUMs.
- High impact (high AUM concentration). Projected AUM reductions representing 5 percent or more of those in the hydrologic subunit or totalling 500 or more AUMs.

'ANIMAL UNIT' IMPACTS FOR TEXAS/NEW MEXICO

- No animal unit reductions (no animal unit concentration).
- Low - moderately low impact (low animal unit concentration). Projected animal unit reductions representing less than 1 percent of those in the county or totalling less than 500 animal units.
- Moderate - moderately high impact (moderate animal unit concentration). Projected animal unit reductions representing less than 5 percent of those in the county or totalling 500-1,000 animal units.
- High impact (high animal unit concentration). Projected animal unit reductions representing 5 percent or more of the animal units in the county or totalling more than 1,000 animal units.

[1]NOTE "ANIMAL UNITS" AND "ANIMAL UNIT MONTHS" ARE NOT EQUIVALENT. THEY REPRESENT DIFFERENT DATA SETS.
[2]CONCEPTUAL LOCATION OF AREA SUPPORT CENTERS (ASCs).

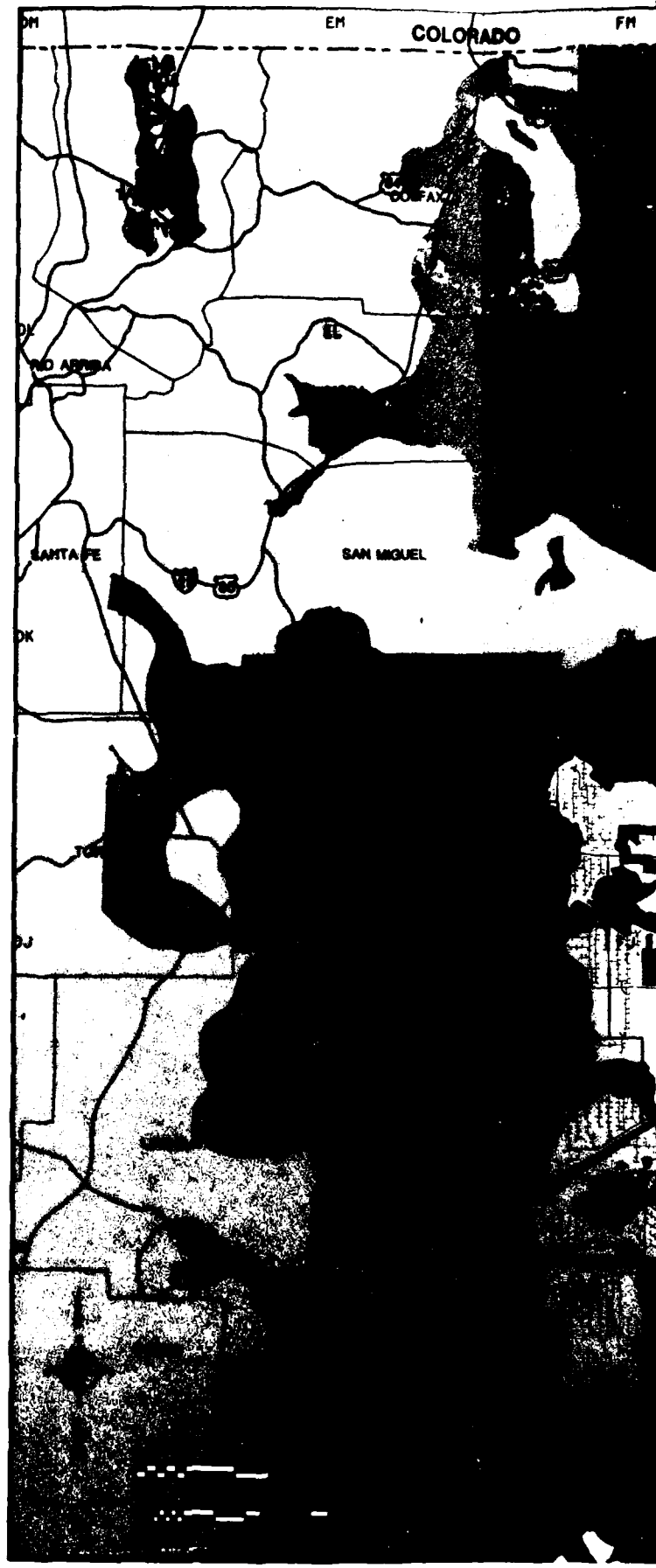
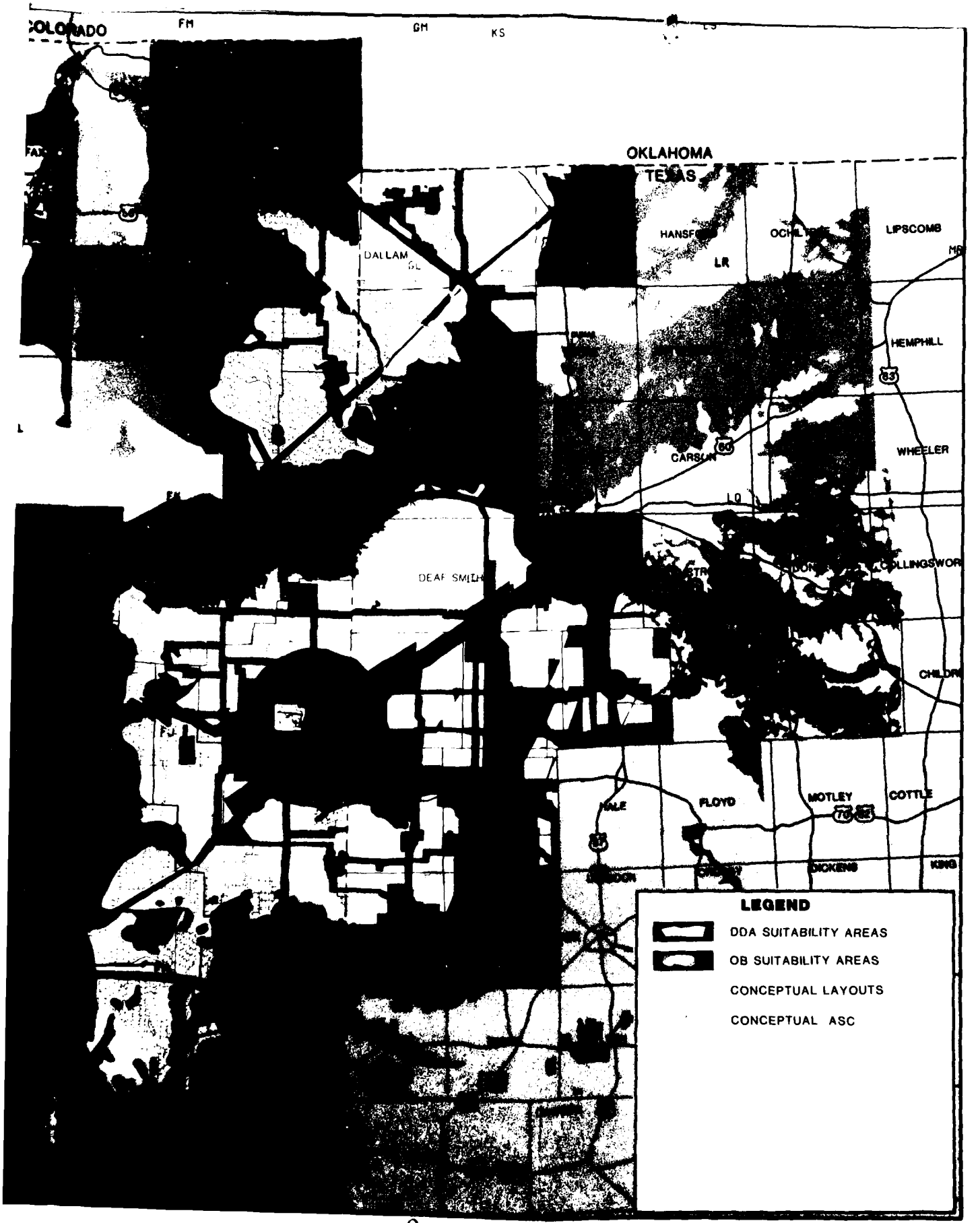


Figure 4.3.2.12-13. Rangeland and the conceptual project layout for split basing, Texas/New Mexico.


COLORADO
FM
GM
KS
OKLAHOMA
TEXAS
DALLAM
HANSF
OCHIL
LIPSCOMB
LR
HEMPHILL
WHEELER
CARSON
DEAF SMITH
CHILDR
HALE
FLOYD
MOTLEY
COTTLE
DICKENS
KING
LEGEND
DDA SUITABILITY AREAS
OB SUITABILITY AREAS
CONCEPTUAL LAYOUTS
CONCEPTUAL ASC

3234-D

Recreation

RECREATION

INTRODUCTION (4.3.2.12.4.1)

This section considers increased demand upon recreational resources due to project-related population in-migration. The Nevada SCORP (1977) notes that "a recreation site 50 mi from an urban center is likely to receive much more visitation than one located 100 mi away:" thus those recreational sites within a 50-mi radius of any given urban growth area are predicted to receive the most significant portion of the increased demand impact.

An approximate 50-mi radius is the assumed area of influence around each of the major urban center expected to receive the greatest population in-migration associated with OB siting (e.g., Delta). This is believed to be a reasonable estimate of the distance a resident will travel to participate in most outdoor recreation activities in a day.

The level of such an impact is considered significant only if the increase in demand is expected to create a supply deficiency beyond normal projected growth or significantly add to a projected baseline deficiency.

PROPOSED ACTION (4.3.2.12.4.2)

DDA Impacts

Figure 4.3.2.12-14 shows the relationship between existing recreational sites and the proposed project configuration. Since recreational sites range throughout the potential DDA, direct project effects would be limited to those areas where overlap occurs. Dispersed recreation may occur nearly anywhere on public lands and they are subject to an undeterminable level of direct impact. Most of this impact would be on such activities as ORV use, rockhounding, driving for pleasure, hiking, etc. In some cases the proposed project may facilitate these activities by increasing access and in other areas the activity may be limited by reduced access. Short term indirect effects will occur in the vicinity of construction camps and long term effects are expected around the operating bases.

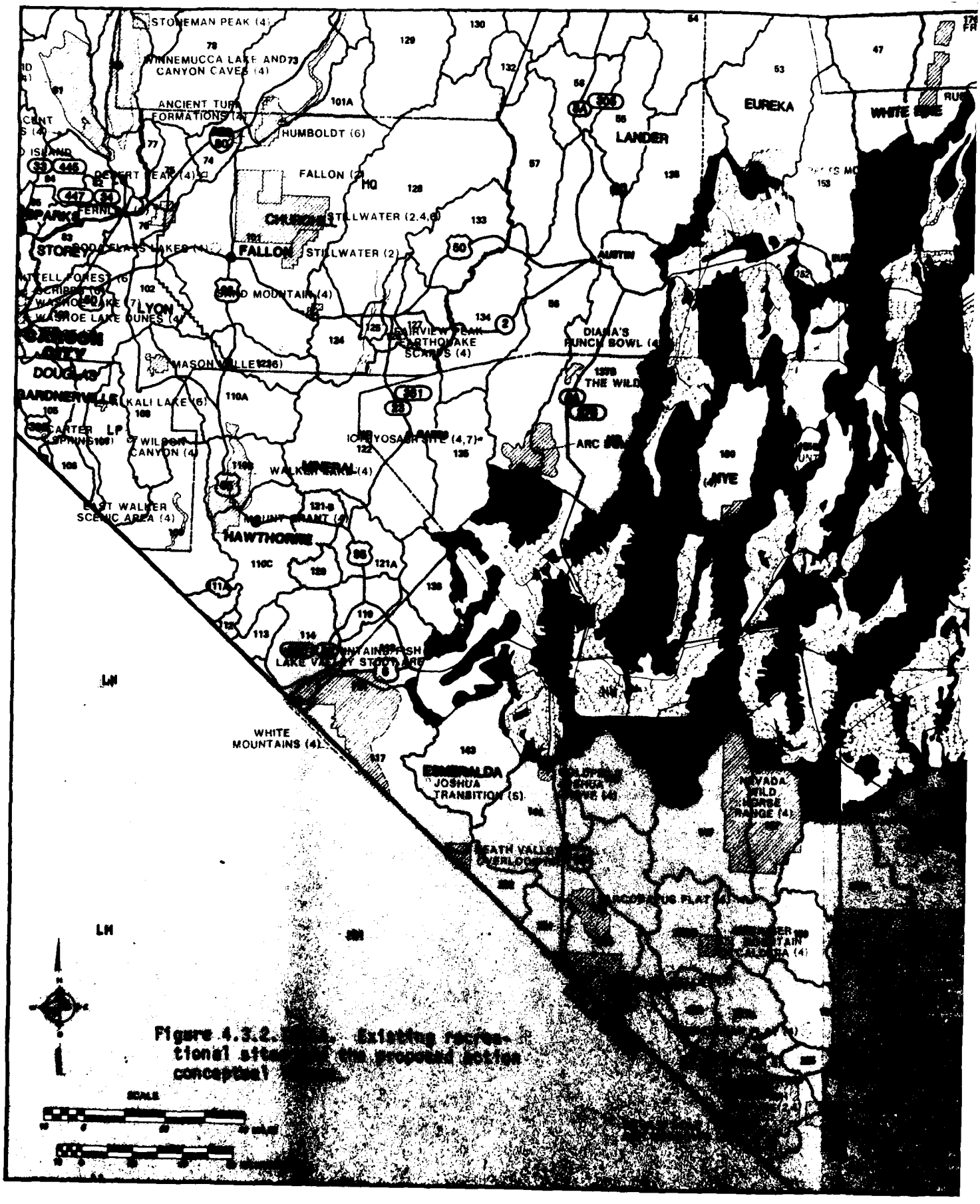
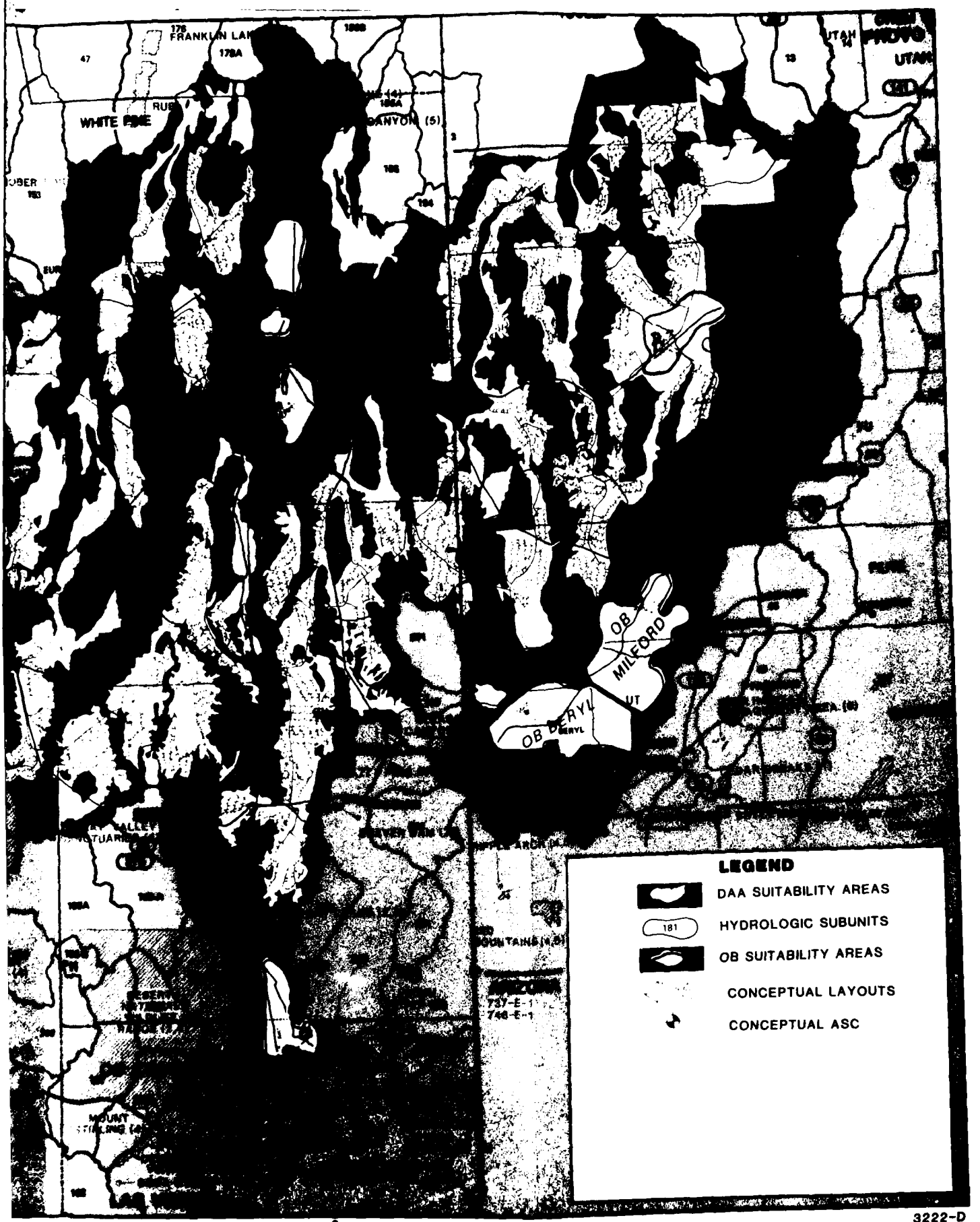


Figure 4.3.2. [illegible]. Existing recreational sites [illegible] the proposed action conceptual


OB MILFORD UT
OB BERYL
LEGEND
DAA SUITABILITY AREAS
181
HYDROLOGIC SUBUNITS
OB SUITABILITY AREAS
CONCEPTUAL LAYOUTS
CONCEPTUAL ASC

3222-D

Both direct and indirect impacts are not significant. The projected increase in recreational trips to parklands with M-X amounts to less than 5 percent of the projected baseline with M-X trips in peak-year 1987 for the Utah/Nevada region. No existing recreational sites are to be directly impacted by the project (see Figure 4.3.2.12-14). The loss of dispersed recreational sites is expected to be minimal and not a significant impact due to the limited amount of public land to be directly impacted.

Figures 4.3.2.12-15 and 4.3.2.12-16 show the relationship between recreation and the Coyote Spring and Milford operating base suitability areas.

Coyote Spring Valley OB Impacts

An OB at Coyote Spring would result in a 5 percent population increase in Clark County in the peak year and a 2.5 percent increase by 1990 over baseline projections. An equivalent increase in recreational demand is expected in those recreational sites around the base (see Figure 4.3.2.12-15. This increase is not expected to add significantly to the projected shortages of campsite facilities or water based recreation facilities in Clark County (Nevada SCORP, 1977). Baseline population projections without M-X indicate a 13 percent increase by 1986 and a 29 percent increase by 1994. Thus, the majority of the effect on recreational resources are expected to be related to the baseline population increase of Clark County and MX in-migration will represent a relatively minor effect (Table 4.3.2.12-9).

Milford OB Impacts

An OB at Milford would result in a 336 percent population increase in the peak year (1989) and a 244 percent increase in 1991 over baseline projections. An approximately equivalent increase in recreational demand is expected in those recreational sites around the base (see Figure 4.3.2.12-16). An analysis of projected needs to meet the expected demand was attempted using a number of assumptions and information from various sources (see ETR-735). Although the Utah SCORP (1978 Draft) projects a shortage of campsites in this region of Utah by 1990, the demand attributable to M-X is not expected to produce a shortage of campsites in the vicinity. Approximately 60 campsites would service the M-X in-migrant population in the peak year. A total of approximately 75 sites would be needed to meet projected needs from Beaver County. The 177 existing campsites in the area would thus meet this demand. Projected shortages (Utah SCORP 1978) may thus be primarily from outside visitations.

Projected demands upon water based recreational facilities would be met by the existing supply of many lakes in the vicinity. Thus, although M-X would create a large population increase over baseline projections, the existing recreational facilities in the immediate vicinity are expected to be adequate to meet the projected increase in demand associated with M-X in-migration (Table 4.3.2.12-9).

ALTERNATIVE 1 (4.3.2.12.4.3)

The proposed DDA is identical to the Proposed Action and will not have a significant impact on regional recreational resources.

The impacts upon recreational resources in and around the proposed Coyote Spring OB site are expected to be equivalent to those described for the Proposed Action.

The placement of an OB site at Beryl would represent a 78 percent population increase in the peak year 1989 and a 53 percent increase in 1993 over baseline projections. Thus, population increase will result in an increase in demand or use of outdoor recreational facilities in the vicinity (see Figure 4.3.2.12-17). An analysis of projected needs adequate to meet this increase in demand was done using a number of assumptions and information from various sources (see ETR 735). These projections are made in an attempt to evaluate the expected impact, however they do not measure it precisely. This region of Utah is presently rich in recreational facilities and the Utah SCORP (1978 draft) does not project any facility needs in the near future with respect to camping and boating. The demand for campsites projected by M-X in-migration is not expected to exceed the present levels of supply in this area.

Although there are a number of lakes in the Beryl vicinity totaling approximately 2,000 surface acres, this supply is short of the projected need of the area with M-X. Much of this impact is expected to be transferred to other facilities further away, e.g., Lake Mead, and thus reduce the local impact. However, additional boating facilities are projected to be needed by 1987 to meet M-X-related demand (see Table 4.3.2.12-9). The overall impact is considered to be moderate. Recreational facilities other than for boating are in adequate supply and, as mentioned above, additional boating areas do exist a little further away.

ALTERNATIVE 2 (4.3.2.12.4.4)

The proposed DDA is identical to the Proposed Action and will not have significant impact on regional recreational resources.

Figures 4.3.2.12-15 and 4.3.2.12-18 show the relationship between recreation sites and OB suitability areas within 50 mi of Coyote Spring, Nevada and Delta, Utah.

Significant impacts upon recreational resources in and around the proposed Coyote Spring OB site are expected to be equivalent to those described under the Proposed Action.

An OB site at Delta would result in a 206 percent population increase in the peak year, 1988, and a 110 percent increase in 1991 over baseline projections for Millard County. This population increase will result in an increase in demand or use of outdoor recreational facilities in the vicinity of Delta (see Figure 4.3.2.12-18). An analysis of projected needs adequate to meet this increase in demand was done using a number of assumptions and information from various sources (see ETR 735). The Utah SCORP (1978 draft) projects a shortage of camping facilities in this region of Utah. Projected campsite demands and needs in the Delta vicinity indicate that the existing supply is adequate to meet the added demands of M-X in-migrants and other Millard County residents. Campsite shortages may still occur. Visitors from other regions of Utah and from out of state along with M-X-induced use may produce shortages. Visitation from surrounding regions is not expected to be influenced by M-X.

Yuba Lake is large enough to serve the needs of boating recreationalists from Millard County with M-X-induced in-migrants. Thus, siting of an OB at Delta is expected to produce minimal impacts upon outdoor recreational and opportunities in the Delta vicinity (see Table 4.3.2.12-9).

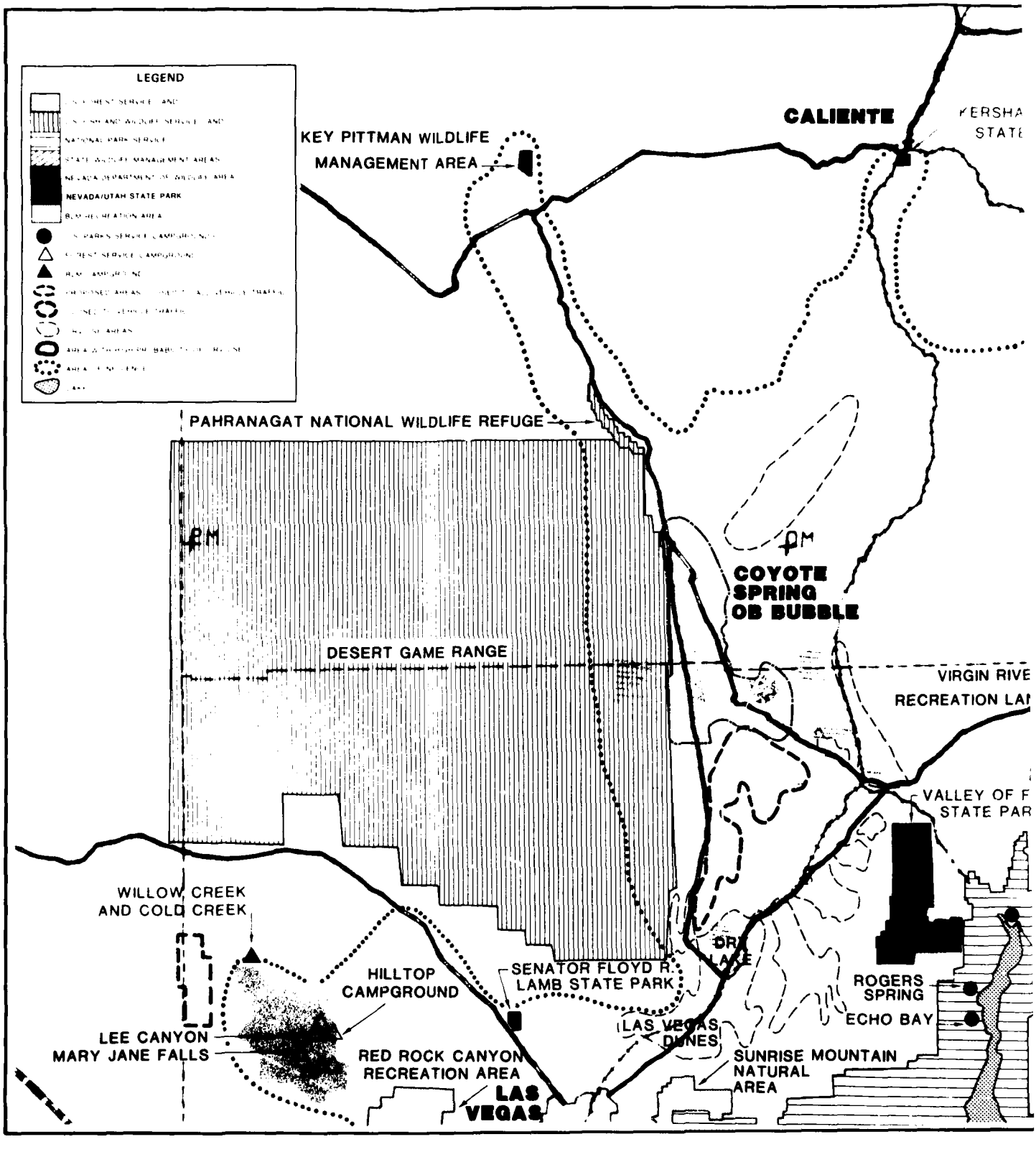


Figure 4.3.
vicinity
OB.

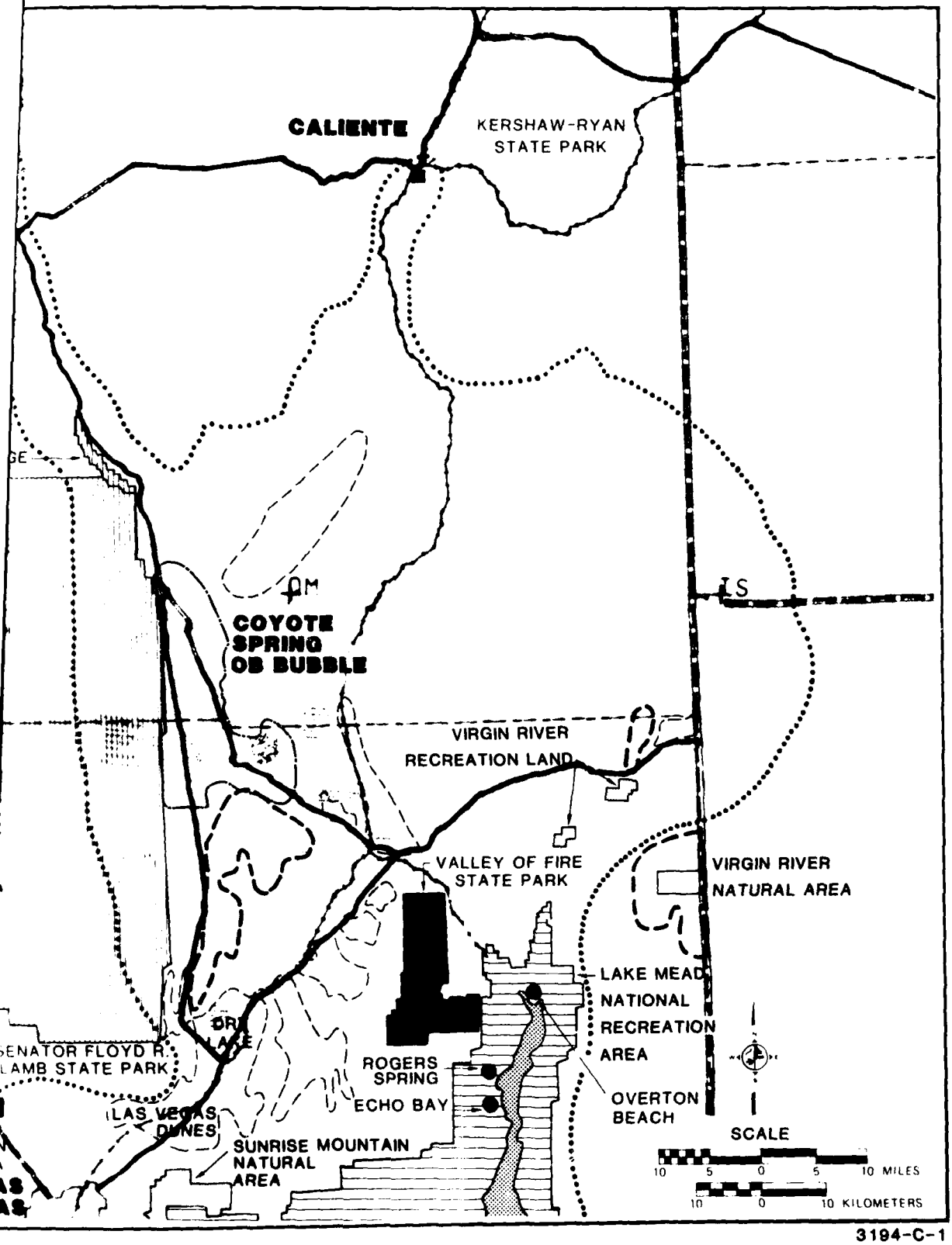


Figure 4.3.2.12-15. Recreational areas in the vicinity of the Coyote Spring Valley, Nevada OB.

2

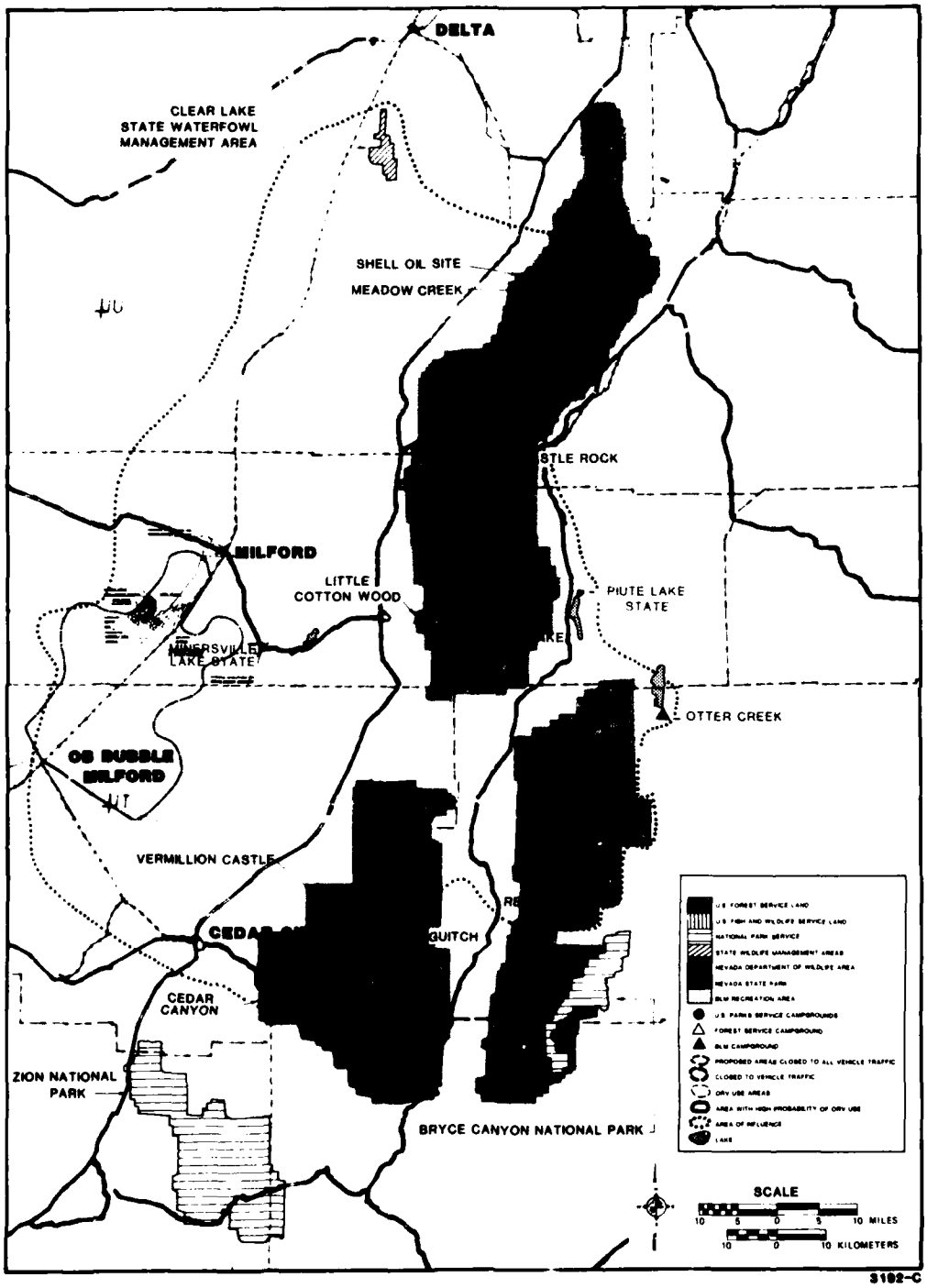


Figure 4.3.2.12-16. Recreational areas in the Milford, Utah vicinity.

Table 4.3.2.12-9. Potential impacts to outdoor recreational sites in the vicinity of OB sites.[1]

RECREATIONAL SITE	POTENTIAL IMPACT[1]				
	MILFORD	BERYL	DELTA	COYOTE	ELY
Lake Mead[2]					
Zion National Park[5]					
Bryce Canyon					
Cedar Breaks National Monument[6,5]					
White River Campground[3]					
Ward Mountain Recreation Area[3]					
Schell Creek Range[3]					
Wheeler Peak Area[3]					
Ruby Mountains					
Dixie National Forest West Sec.[5]					
Dixie National Forest East Sec.[6]					
Red Canyon Recreation Area[2]					
Kents Lake[6]					
Shell Oil Site[4,6]					
Oak Creek[4]					
Little Valley[4]					
Valley of Fire[3]					
Beaver Dam[5]					
Cathedral Gorge[5]					
Snow Canyon[5]					
Echo Canyon[5]					
Corral Pink Sand Dunes					
Charcoal Ovens State Park[3]					
Gunlock Lake[5]					
Enterprise Reservoir[5]					
Navajo and Panguitch Lakes[4,5]					
Otter Creek Reservoir[6]					
Piute Lake[1,6]					
Yuba Lake[4]					
Comins Lake[3]					
Bassett Lake[3]					
Las Vegas ORV Areas[2]					
Sand Mountain					
Little Saharah Recreation Area[4]					
Minersville Lake[5,6]					
Overall Impact					

4044

None. M-X-related population growth not expected to produce a measurable increase in demand on the resource.

Low. M-X-related population growth expected to increase demand but not create a deficiency in the availability of the resource.

Moderate. Resource beyond 50 miles (assumed area of influence) for which M-X-related population growth may create or add to a projected deficiency in availability.

High. M-X-related population growth projected to create a deficiency or significantly add to projected deficiency in the availability of the resource.

[2]Recreation sites within 50 miles of the assumed area of influence, Coyote OB.

[3]Recreation sites within 50 miles of the assumed area of influence, Ely OB.

[4]Recreation sites within 50 miles of the assumed area of influence, Delta.

[5]Recreation sites within 50 miles of the assumed area of influence, Beryl.

[6]Recreation sites within 50 miles of the assumed area of influence, Milford.

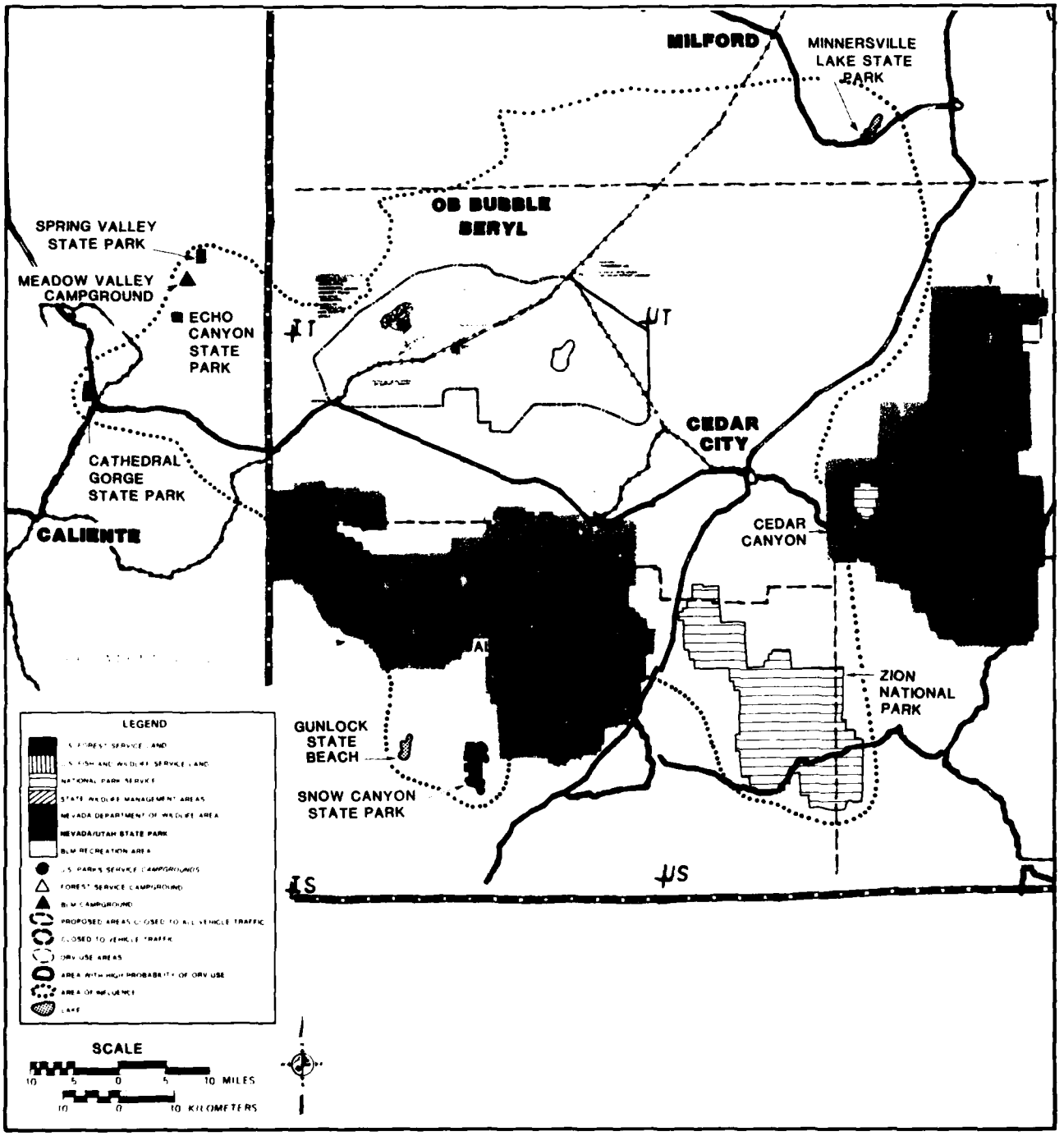


Figure 4.3.2.12-17. Recreational areas in the Beryl, Utah, vicinity.

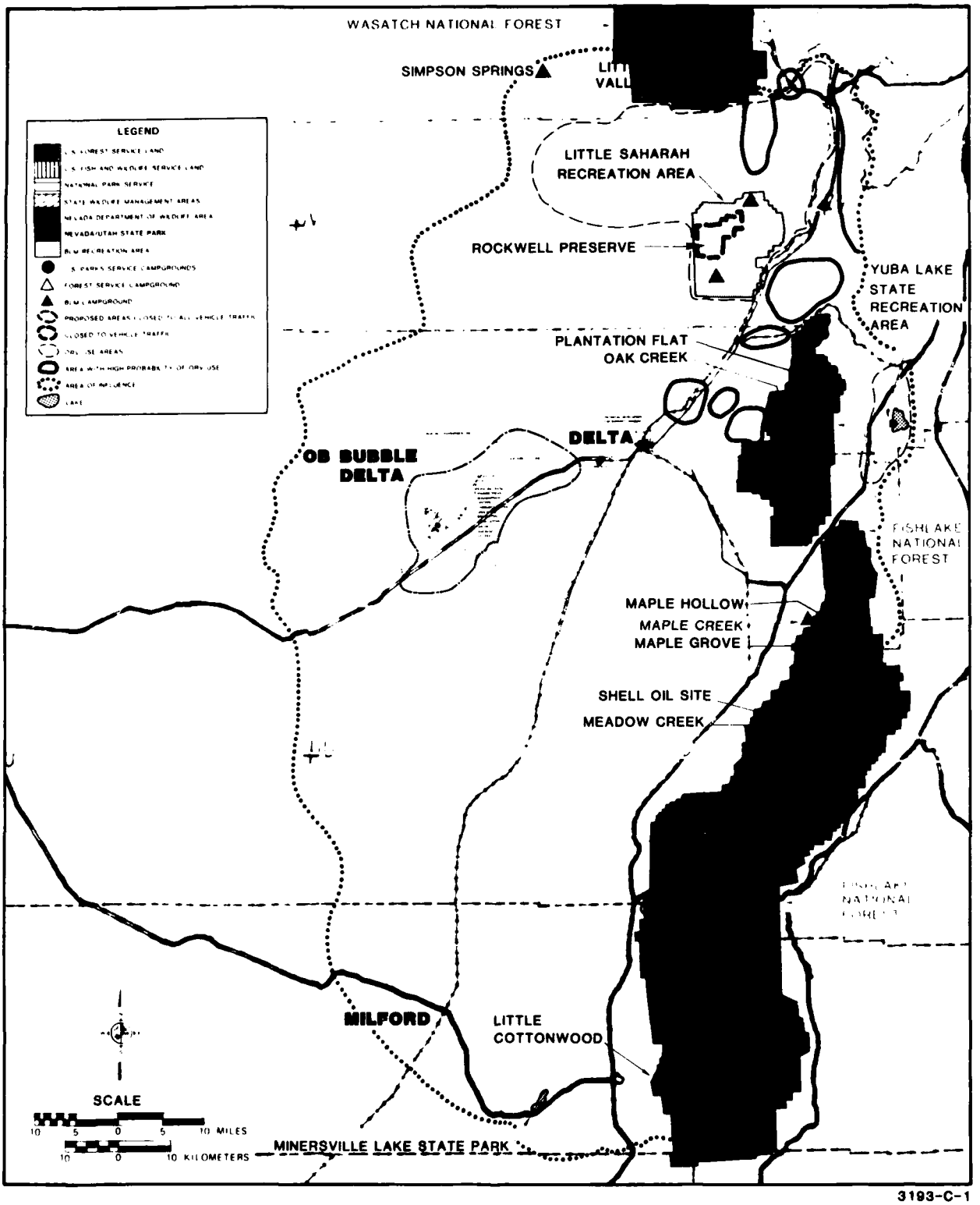


Figure 4.3.2.12 18. Recreational areas in the Delta, Utah, vicinity.

ALTERNATIVE 3 (4.3.2.12.4.5)

The proposed DDA is identical to the Proposed Action and will not have significant impact on regional recreational resources.

Figures 4.3.2.12-17 and 4.3.2.12-19 show the relationship between recreation sites and OB suitability area within 50 mi of Beryl, Utah and Ely, Nevada.

The potential impacts associated with the OB site at Beryl are discussed under Alternative 1.

The proposed OB site in White Pine County will result in a M-X induced population in-migration of some 21,000 people by peak year 1988, dropping off to 14,000 by 1991. These increases represent a more than doubling of the projected population due to M-X and other proposed projects. Without other proposed projects, such as the White Pine Power Project, M-X would increase the population of White Pine County 3 times over baseline projections. Recreational demand is expected to rise proportionally with these population increases.

Two recreational activities are projected by Nevada SCORP (1977) to suffer from resource deficiencies, water-based recreation and tent/trailer and vehicle camping. Of those recreation resources within 50 mi expected to receive the most significant levels of the increased demand, only three lakes, Comins, Bassett and Cave Lake are available for recreational use (Table 4.3.2.12-9). These lakes provide a maximum of 172 surface acres of water. Motor-boating and waterskiing facilities in this region are in short supply. At present residents typically have to travel to other regions of Nevada, such as Lake Mead or Ruby Marsh, to participate in these activities. Present demand for these resources is very high as evidenced by the 32,300 visits to Cave Lake in 1979, second only to Lehman Caves National Monument (40,300). Visitor demands for baseline population without M-X are expected to increase by 8.0 percent per year, and by 1988 baseline demand could reach as much as 69,000 visits, or more than double the existing level at Cave Lake. With the participation rate (.65) for motorboating in the summer only in this region, the M-X in-migration may be expected to produce some 14,000 additional visits in 1987 and 9,000 each year after 1991. This represents an additional 39 percent increase over the baseline projection in 1988 and a 20 percent increase over the baseline projections (85,500) in 1991. Using the Nevada SCORP standard of 1.25 persons/surface acres and their formula for facility need, (see ETA 20) indicates an M-X related need of approximately 341 additional surface acres for boating. Using the same method for waterskiing indicates a need of 234 additional surface acres by 1987. Thus, the demand for motorboating and waterskiing would be about 3.5 times greater than the available resource for the M-X population alone. Based upon the average effects index analysis (see ETR 855) all three of these lakes are expected to receive relatively high use from the Ely base. The White Pine Power Project is expected to double the population in White Pine County by 1987. The White Pine Power Project will have an effect on recreational demand, but it would not be as large as that due to M-X.

A significant impact is expected upon camp sites in the area (see Table 4.3.2.12-9). At present there are 176 campsites within an hour or hour and a half driving from Ely. Using Nevada SCORP (1977) figures, by peak year 1987 a total of 111 sites will be needed to meet the demands of M-X induced in-migration.

Baseline growth will require 47 camp sites to meet its projected demand. Although the present supply of camping sites will meet the demands of future growth with M-X for the Ely area, the added demand from outside the Ely area may create a camping site shortage. As indicated in the average effects index analysis the campground areas of the Humboldt National Forest immediately around Ely and the Charcoal Ovens State Park are expected to receive a significant portion of the added demand. Compared to other U.S. Forest Service sites in the region, the sites around Ely currently have a low visitation rate, due primarily to their relative isolation from a large urban center.

There are few opportunities to provide more water-based recreation sites in this region.

Additional campsites are possible in the large public land holdings surrounding Ely (BLM and Humbolt National Forest). Management practices limiting the effect on the resource itself may be necessary, i.e. tighter control of water-based recreation to limit conflicts of area and resource quality. Given the limited supply of the resource in this region there is no way the impacts upon water-based recreation can be mitigated.

ALTERNATIVE 4 (4.3.2.12.4.6)

The proposed DDA is identical to the Proposed Action and will not have significant impact on regional recreational resources.

Figures 4.3.2.12-15 and 4.3.2.12-17 show the relationship between recreation sites and the OB suitability areas for Beryl, Utah and Coyote Spring, Nevada.

In this alternative the Beryl site is a first base and thus has a higher population in-migration than in Alternative 1, where it is a second base (22,000 vs 17,000 people during peak years and 17,000 vs 13,000 at steady state). The rates of in-migration will differ somewhat; the peak year for this alternative is expected in 1986, with a gradual decline to a steady state four years later in 1990. In Alternative 1 the rate of in-migration is gradual up to the peak year 1989, followed by a rapid decline to steady state in 1991. This represents a 20 percent increase in population as a first base over the second base alternative. Potential impacts associated with the OB site at Beryl are discussed under Alternative 1.

Recreational impacts associated with the basing at Coyote Spring are expected to be somewhat less than in the Proposed Action. The projected population in-migration figures are 30 percent lower for this alternative (19,000), and the peak year is later, 1988 vs. 1986 for the Proposed Action. These changes in the population in-migration is expected to reduce the impact to some undetermined level.

ALTERNATIVE 5 (4.3.2.12.4.7)

The proposed DDA is identical to the Proposed Action and will not have significant impact on regional recreation.

Figures 4.3.2.12-16 and 4.3.2.12-19 show the relationship between recreational sites and the OB suitability areas for Milford, Utah and Ely, Nevada.

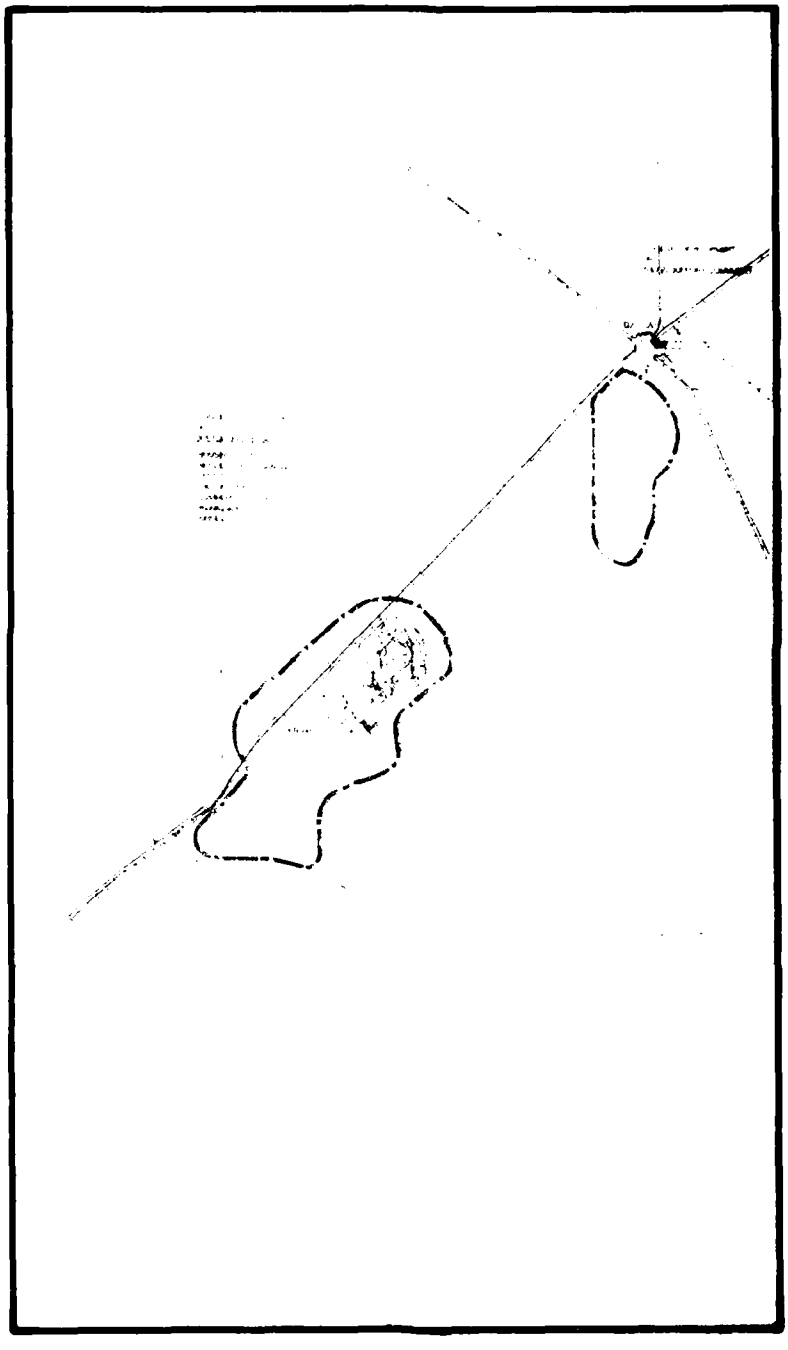


Figure 4.3.2.12-19. Recreational areas in the Ely OB vicinity.

In this alternative the Milford site is a first base and thus has a higher population in-migration than the Proposed Action, where it is a second base (24,000 vs. 17,500 people during peak years and 17,000 vs. 13,000 at steady state). The rates of in-migration will differ somewhat from those of Milford as a second base. There is a 20 percent increase in population as a first base over the second base alternative. Impacts associated with the OB site at Milford are discussed under the Proposed Action.

Impacts at Ely were discussed under Alternative 4.

ALTERNATIVE 6 (4.3.2.12.4.8)

The proposed DDA is identical to the Proposed Action and is not projected to have significant impact on regional recreation.

Figures 4.3.2.12-15 and 4.3.2.12-16 show the relationship between recreation sites and 50 mi around Milford, Utah and Coyote Spring, Nevada.

Impacts from an operating base at Milford would be identical to those shown for Proposed Action.

Impacts at Coyote Spring were discussed under Alternative 4.

ALTERNATIVE 7 (4.3.2.12.4.9)

Figure 4.3.2.12-20 shows the relationship between recreational sites and the proposed project configuration. Increased recreational demand as a result of M-X in-migration into the Texas/New Mexico region is not expected to be significant over the life of the project. Significant impacts may be experienced at various locations near OB sites, however.

Figure 4.3.2.12-21 and 4.3.2.12-22 show the relationship of recreation sites within 80 mi of the Clovis, New Mexico and Dalhart, Texas OB sites.

The basing at Clovis is expected to increase the population in Curry County by 60 percent over baseline projections by the peak year of 1986. An equivalent increase in recreational demand is expected. Outdoor recreational sites expected to receive the major portion of this increase in demand are Sumner Lake, Ute Lake and Oasis State Park (see Table 4.3.2.12-10). Each of these sites is within an hour's driving time and thus are easily accessible (Figure 4.3.2.12-21).

Baseline projections indicate that each of these sites are expected to need added camping and picnicking facilities (New Mexico, SCORP, 1976). The added M-X demand is expected to increase the need by at least 50 percent. By 1986, it is projected that 400 added campsites will be needed in these areas to support the baseline growth, with M-X, 800 more campsites will be needed to support the in-migration into Curry County.

With time, the increase in population will level off to roughly 43 percent over baseline projections. Although this decrease will reduce recreational demands compared to peak year levels, this still represents a significant demand increase over baseline figures.

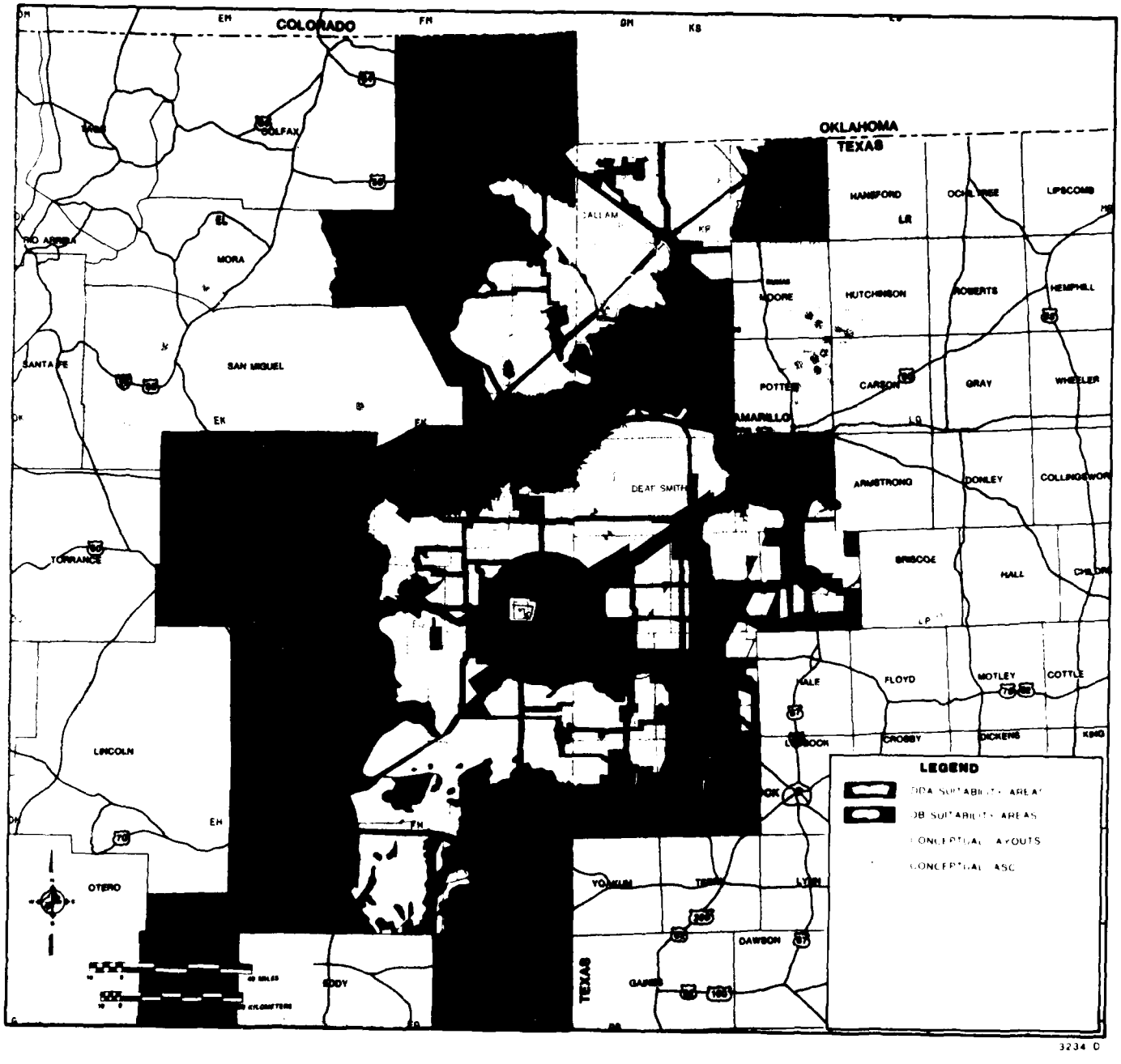


Figure 4.3.2.12-20. Recreational areas, Texas/New Mexico, and Alternative 7.

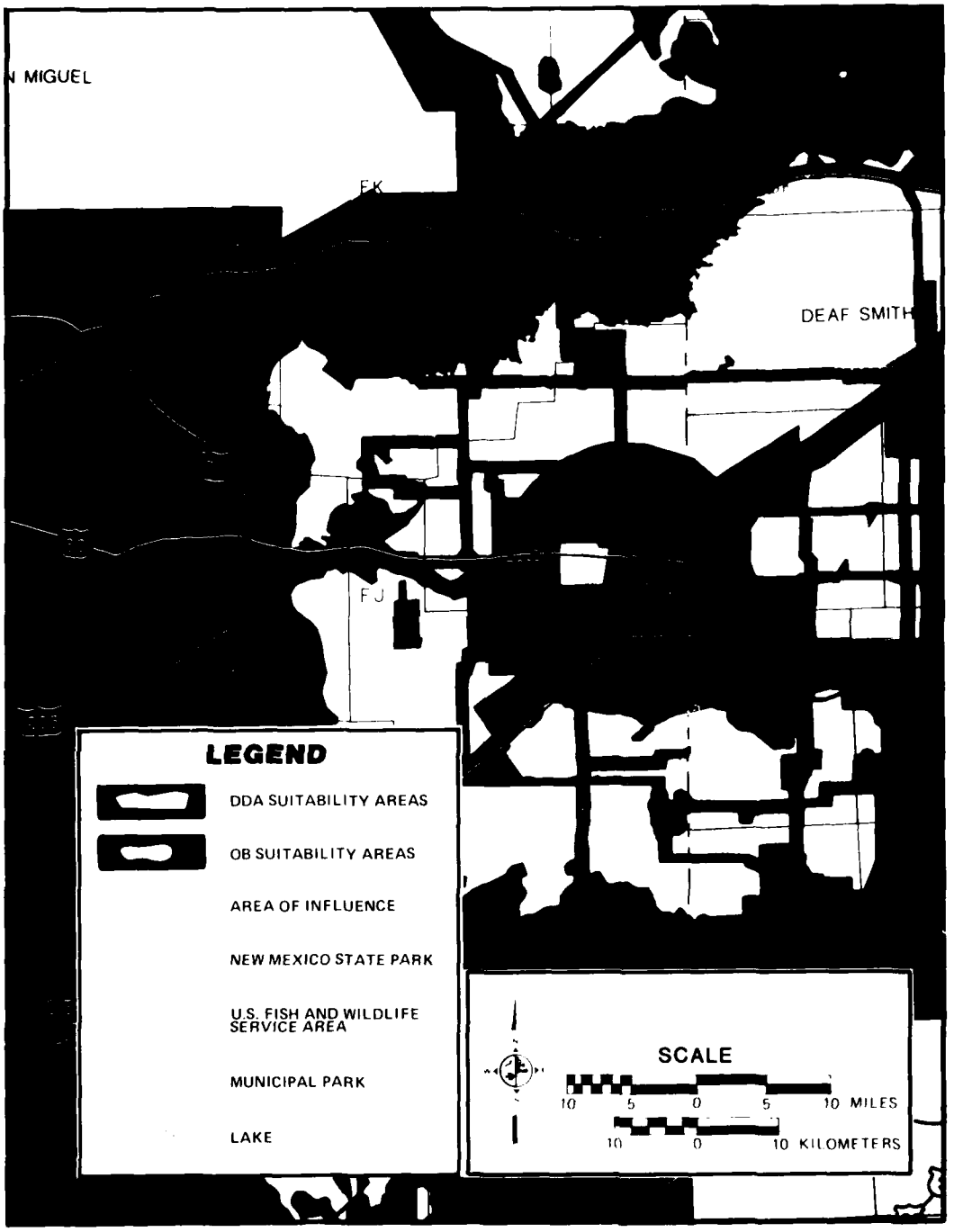


Figure 4.3.2.12-21. Recreational areas in the Clovis OB vicinity.

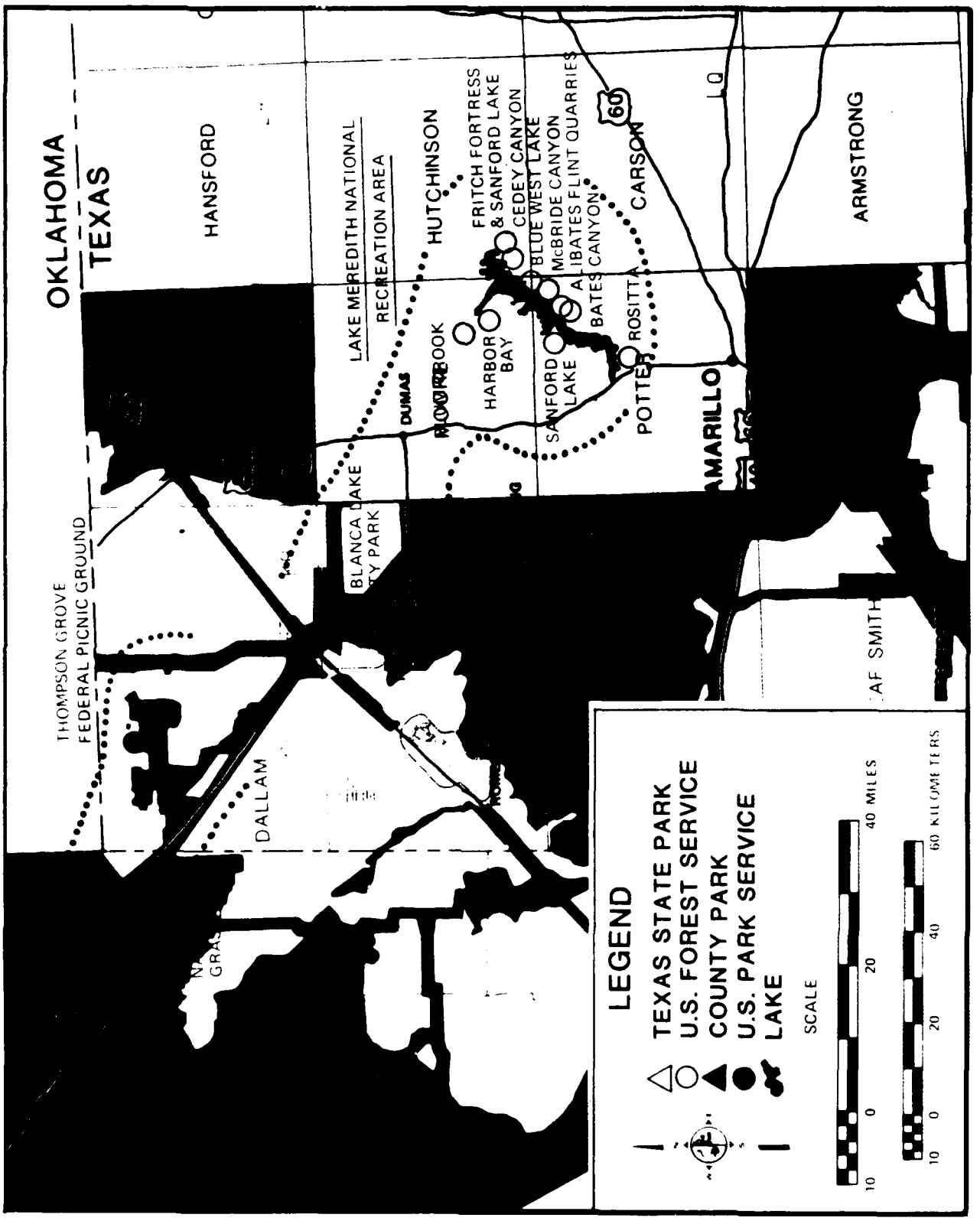


Figure 4.3.2.12-22. Recreational areas in the Dalhart OB vicinity.

Table 4.3.2.12-10. Potential impacts to outdoor recreational sites in the vicinity of the OB sites, Clovis, New Mexico and Dalhart, Texas.

RECREATIONAL SITE	ESTIMATED IMPACT[1]	
	CLOVIS	DALHART
Lake Meredith National Recreation Area[3]		
Clayton Lake State Park[3]		
Kiowa National Grasslands[3]		
Thompson Grove Fed. Picnic Grounds[3]		
Rita Blanca Lake County Park[3]		
Panhandle Plains Historical Monument		
Palo Duro Canyon State Park		
Buffalo Lake National Wildlife Refuge		
Muleshoe National Wildlife Refuge[2]		
Caprock Canyons State Park		
Oasis State Park[2]		
Carlsbad Caverns National Monument		
Living Desert State Park		
Bottomless Lakes State Park		
Fort Sumner State Monument[2]		
Sumner Lakes State Park[2]		
Ute State Park[2]		
Tucumcari Municipal Park[2]		
Conchas Lake State Park		
Fort Union National Monument		
Storrie Lake State Park		
Villanueva State Park		
Cibola National Forest		
Santa Fe National Forest		
Valley of Fire National Park		
Lincoln National Forest		
Overall Impact		

4045-1

None. M-X-related population growth not expected to produce a measurable increase in demand on the resource.

Low. M-X-related population growth expected to increase demand but not create a deficiency in the availability of the resource.

Moderate. Resource beyond 50 miles (assumed area of influence) for which M-X-related population growth may create or add to a projected deficiency in availability.

High. M-X-related population growth projected to create a deficiency or significantly add to projected deficiency in the availability of the resource.

[2]Recreation sites within 50 miles, the assumed area of influence, of the Clovis OB.

[3]Recreation sites within 50 miles, the assumed area of influence, of the Dalhart OB.

There is no notable change in productivity or irretrievable resource commitment.

The impact associated with M-X is expected to be additive to projected needs, however, by doubling the need, planning alternatives will probably require revision in any attempt to meet these needs. Because some resources, like lake acreages, are dependent upon natural features to provide additional supply, these resources may not be expandable and the demand would then be either transferred to another form of recreation or to a site further away.

Increased recreational demand is expected in the Dalhart region as a result of the M-X induced in-migration over the projected baseline increase. This increase in demand attributable to M-X in-migration is relatively minor when compared to the baseline increase. For instance, 1,540 picnic tables will be needed to meet the demand in Potter and Randall counties in 1987. Of this total, M-X in-migrants are projected to require only about 300 tables per year. Thus, approximately 80 percent of the total demand is attributable to baseline growth and two-thirds of the need is a result of baseline growth (see ETR 735). Boating facilities are in adequate supply in this region to meet projected M-X demands.

ALTERNATIVE 8 (4.3.2.12.4.10)

As described in the Proposed Action section no significant impacts are expected upon recreational resources as a result of the DDA.

Figures 4.3.2.12-15 and 4.3.2.12-21 show the relationship between recreation sites and the 50 mi area of influence around the Coyote Spring, Nevada and Clovis, New Mexico OB sites.

Impacts associated with the Coyote Spring OB site is equivalent to those described in the Proposed Action.

Impacts associated with the Clovis OB site is equivalent to those described in Alternative 7.

Native Americans

NATIVE AMERICAN CULTURAL RESOURCES

INTRODUCTION (4.3.2.13.1.1)

Native American cultural resources include a wide variety of sites, features, and biota, which may be grouped roughly into ancestral/sacred areas and hunting/gathering areas. Cultural resources include ancestral settlements, burial areas, historic event sites, cosmological event sites, ancestral trails, hot springs, rock art sites, ceremonial/ritual sites, homes of spiritual beings, sacred materials (medicinal plants, sacred stone quarries, sacred paint clays, sacred feathers, sacred animal skins and other body parts), traditional food gathering areas (pine-nuts and other native plants), traditional hunting areas, and traditional craft materials (basketry and cradleboard materials, pottery materials, etc.). While all of these cultural resources are included in the DEIS analysis, they are assigned varying degrees of cultural and scientific significance, and have disparate impact potentials.

The relative significance of Native American cultural resources was assessed on the basis of five criteria that may also affect National Register eligibility:

1. Expressed Concern by Native Americans (scoping meetings, tribal council resolutions and communications, preliminary field data).

2. Site or Resource Uniqueness (the extent to which destruction of the site or resource would represent a serious or irreplaceable loss to the Native American community in terms of heritage preservation and traditional lifeways).

3. Resource Variety in a Site or Region (the degree of site or resource density in areas subject to direct and indirect impacts).

4. Past and Present Usage (the extent to which sites or resource areas continue to be exploited or actively utilized in the traditional manner by contemporary peoples).

5. Scientific Significance (the extent to which Native American sites and resource areas have independent importance in the scientific community,

i.e., are eligible for the National Register of Historic Places and/or represent important data sources for the advancement of a body of knowledge).

Applicable federal legislation relevant to these criteria of significance includes the National Environmental Policy Act (Section 101(b)(4)) and the Council on Environmental Quality regulations (40CFR1500-1508, Sections 1501.7(a)(1), 1506.6(3)(ii), 1508.8(b), and 1508.14); the National Historic Preservation Act, Executive Order 11593, and 36CFR800-Protection of Historic and Cultural Properties (36CFR800(a)(1) and 36CFR800.15) and the American Indian Religious Freedom Act (Public Law 95-341). Native American cultural resources which received high significance rankings on the basis of all five criteria are ancestral/sacred sites and areas.

Impacts were assessed by comparing both known and predicted locations of ancestral/sacred sites and areas with the proposed DDA and OB layouts. Over 300 such sites appear in the archaeological record, and may be precisely located. These, however, represent only a small fraction of the total cultural resource base. Areas of predicted site densities were identified for deployment area valleys on the basis of historical and ethnographic accounts, and from information provided by local Native Americans.

Two general criteria were applied in the impact assessment: (1) proximity (the geographical relationship of significant sites and resource zones to areas slated for project construction and operations), and (2) accessibility (the likelihood of areal penetration and resultant damage or loss by either construction activity or public vandalism). Due to the long occupation of ancestral Native American populations in the deployment area, and the migratory nature of their communities, significant cultural resources are widely distributed throughout the valleys subject to ground disturbance and population influx.

Impacts to Native American cultural resources have two primary sources: ground disturbance associated with construction; and pilfering, vandalism, and ground disturbance (ORV traffic, erosion) associated with increased public access to previously isolated areas. It is assumed that direct impacts are most likely to occur to ancestral/sacred sites which fall within a one-mile radius of construction activities. The short-term indirect impact potential is estimated on the basis of the proximity of DDA valleys to OB sites, construction camps, and other proposed projects, all of which are associated with varying degrees of population in-migration. The overall short-term impact is a cumulative index of both direct and indirect effects, i.e. the level of proposed ground disturbance during construction, proximity of construction activities to sensitive areas, the presence or absence of construction camps, OBs, and other projects in or near the DDA valley. Long-term effects are, for the majority of the valleys, predicted to be more intense than short-term effects, due to the non-renewable nature of the resource. Impacts to ancestral/sacred sites during the operations phase and beyond are associated with increased recreational use, vandalism, and illegal excavation. The DTN system will open isolated areas to public access on a previously unparalleled scale. Studies in comparable environments, such as the adjacent California desert (Lyneis, Weide, and Warner 1980), indicate that recent public use of the area for recreation has resulted in extremely high vandalism rates to rock art (80 percent), ancestral habitation sites (74-78 percent), ceremonial sites or structures (66 percent), and battlefields (65 percent). A comparable level of long-term disturbance is predicted for the majority

of DDA valleys. Key factors in the overall long-term impact potential are proximity to OBs and the degree of public accessibility provided by the DTN and cluster roads in each DDA valley.

A third type of impact, which cannot be quantified, is the symbolic and spiritual effect on Native American traditional religions and cultural persistence. The M-X system will irreversibly alter the Holy Lands of Shoshone and Southern Paiute peoples. Since ancestral/sacred sites and features are non-renewable, any destruction or defacement of these resources represents an irretrievable loss to the Native American and scientific communities.

PROPOSED ACTION (4.3.2.13.2)

DDA Impacts

The DDA contains 313 known ancestral/sacred sites, 39 of which are within 1 mi of the representative protective shelters, cluster roads and DTN used in this analysis. In addition to specific sites, there are general areas within the DDA valleys known to be associated with late prehistoric and historic Indian settlements (see Figure 4.3.2.13-1). DDA valleys are ranked according to predicted resource abundance based on available data (see Table 4.3.2.13-1).

There are several ways in which potential impacts may be reduced. Tier Two environmental surveys and analysis will identify site specific resources so that planned avoidance during actual siting can be incorporated to the degree possible. There is no known way to effectively eliminate or substantially reduce the destruction and vandalism of sites accompanying the increased public recreational use of wilderness areas. Data recovery of cultural resources subject to direct impact, in consultation with Native Americans, is a possible mitigative measure. Indian reservations and colonies throughout the proposed deployment area are currently placing emphasis on cultural heritage programs, including the development of tribal museums. Renewed and expanded competition between tribal governments and land management agencies over the jurisdiction, proper treatment, and ultimate allocation of this potentially large inventory of Indian artifacts, however, is a possible source of conflict. Financial aid to tribal governments for the establishment of reservation museums, and an established program for the return of requested utilitarian and sacred artifacts to tribal groups is a possible mitigative measure to aid Native Americans in the preservation of their traditional lifeways for future generations.

Coyote Spring Valley OB Impacts

The Coyote Spring OB lies on a major seasonal migration route of ancestral Southern Paiutes and is associated with both temporary and permanent habitation sites, burials, and a wide variety of other sacred features. Although precise site locational data are scant, several general areas in and adjacent to the OB siting area are known to have been occupied by the ancestors of contemporary peoples (see Figure 4.3.2.13-2). These include Coyote Spring, foothill areas adjacent to the White River from Coyote Spring north to Alamo in Pahranagat Valley, Kane Springs Wash; the Sheep Range, all ephemeral streams and washes in Coyote Spring Valley which feed Muddy Springs, Muddy Springs proper, the entire length of the Muddy River and Meadow Valley Wash. Site densities are expected to be high throughout

the OB siting area with a high potential for direct impacts to ancestral settlements and associated burials during the construction phase.

Areas adjacent to the OB facilities will be opened up to more extensive public use during the operations phase. Indirect impacts, to ancestral/sacred sites such as pilfering and vandalism, will likely result from the substantial population in-migration associated with the base (see Table 4.3.2.13-2). Arrow Canyon, for example, which lies just southeast of the OB site, is regarded as sacred by contemporary Southern Paiutes. This holy place contains spiritual areas and important rock art sites, many of which have already been disturbed by vandals. Other significant Southern Paiute cultural resource sites, such as burials, surface settlements, and storage caves, which currently enjoy a high degree of integrity, are similarly imperiled by base development. At present, there are no known effective measures to prevent the recreational intrusion of surrounding pristine areas. Finally, contemporary Southern Paiutes continue to utilize the public lands in question for traditional activities, including the gathering of sacred plants. Any depletion of the water table associated with construction needs may reduce flow to springs and marshes on which such species depend, thereby limiting Native American access to sacred plants.

Potential mitigation measures should be developed in association with the Moapa Reservation tribal government. In comparable Air Force projects, mitigation measures have included on-site inspection of proposed disturbance areas by designated tribal members to identify sites and features which have cultural and sacred significance to local Indians and where avoidance of such sites is not possible, data recovery programs. Representatives of the Moapa Reservation consider return of artifacts to the Reservation and possible financial assistance for their curation and display at a tribal museum to be important measures which will contribute to the retention of a cultural identity and a heritage for succeeding generations.

Milford OB Impacts

The northern Escalante Desert was part of the ancestral territory of the Kwiumpits band of Southern Paiutes, whose farming settlements were concentrated along the Beaver River. Direct impacts to significant resources may occur as a result of support community construction in the vicinity of Milford, although disturbance in this area is already considerable due to irrigation farming. Direct impacts to campsites associated with seasonal food gathering and antelope drives are probable along ephemeral streams which flow from the Wah Wah Range and southern tip of the San Francisco Mountains into the OB siting area (see Figure 4.3.2.13-3). Site data, however, are too incomplete to accurately predict the intensity of direct impacts at this time. Projections on the radius of indirect impacts appear in Table 4.3.2.13-3.

A potential mitigation measure would be the inclusion of representatives from the Kanosh and Cedar City bands of Utah Southern Paiutes in preconstruction surveys of proposed disturbance areas to determine if culturally significant sites are present.

ALTERNATIVE 1 (4.3.2.13.1.3)

Predicted impacts to significant Native American cultural resources in the DDA and in the area of the Coyote Spring OB are identical to those indicated for the Proposed Action.

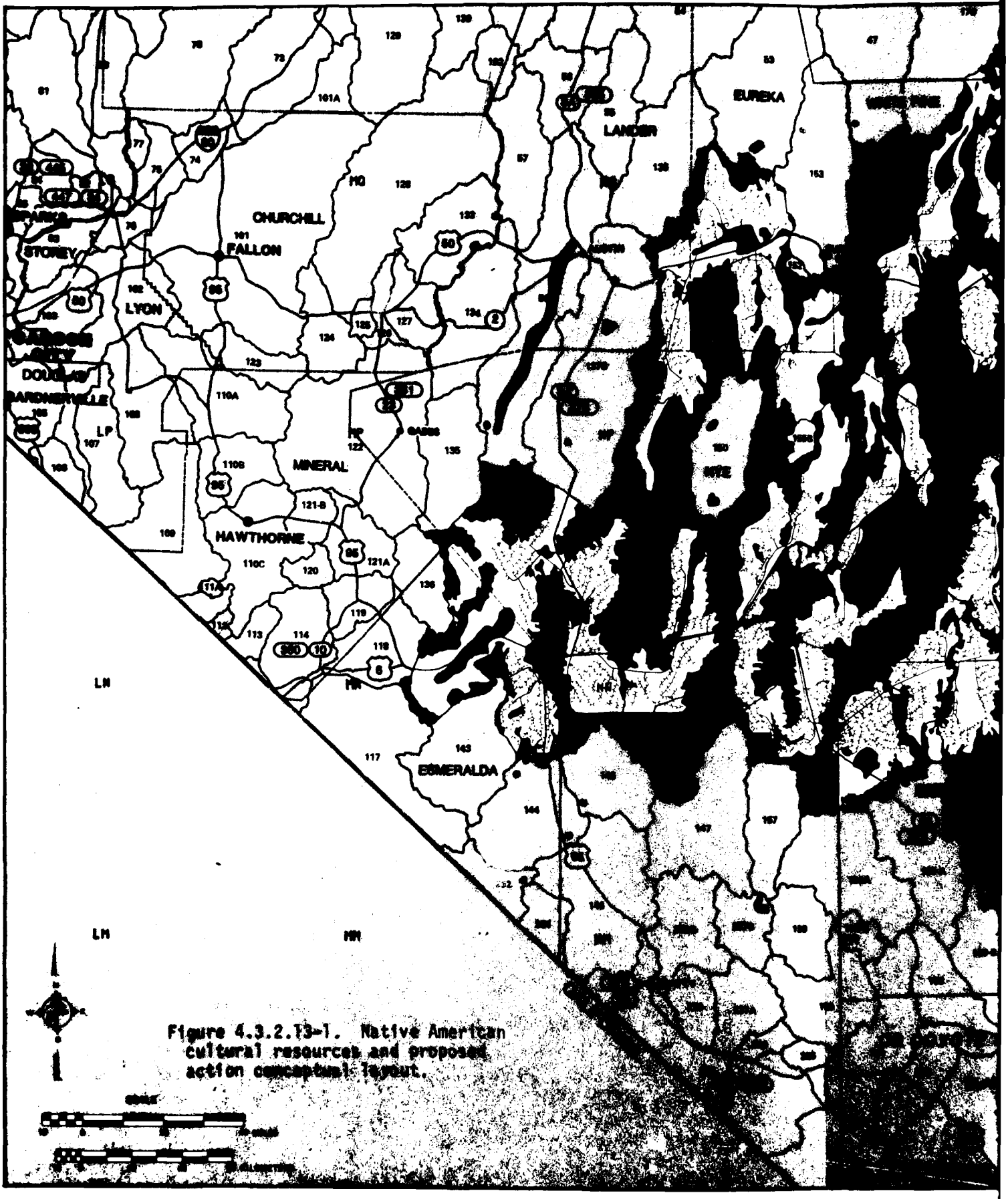
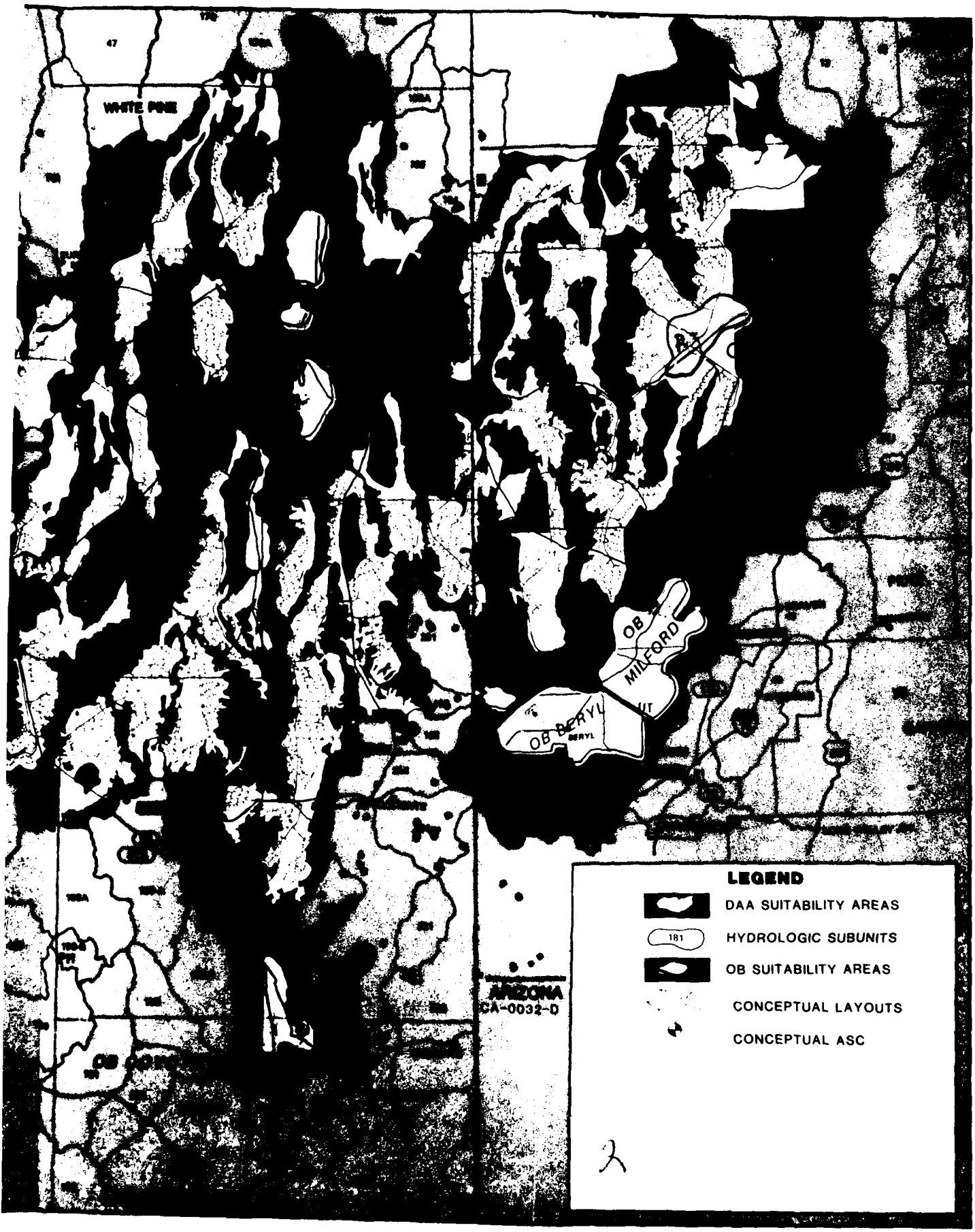


Figure 4.3.2.13-1. Native American cultural resources and proposed action conceptual layout.


WHITE PINE
OB MILFORD
OB BERYL
BERYL
ARIZONA
CA-0032-D
LEGEND
DAA SUITABILITY AREAS
181
HYDROLOGIC SUBUNITS
OB SUITABILITY AREAS
CONCEPTUAL LAYOUTS
CONCEPTUAL ASC

3222-D

Table 4.3.2.13-1. Potential impacts to Native American ancestral/sacred sites in Nevada and Utah DDA for the Proposed Action and for Alternatives 1-6.

HYDROLOGIC SUBUNIT		ABUNDANCE INDEX[1]	SHORT-TERM EFFECTS			LONG-TERM EFFECTS	
NO.	NAME		NUMBER OF DIRECT IMPACTS TO KNOWN SITES	INDIRECT IMPACT POTENTIAL[2]	POTENTIAL IMPACT[3]	NUMBER OF KNOWN SITES SUBJECT TO INDIRECT IMPACTS	POTENTIAL IMPACT[4]
	Subunits with M-X Clusters and DTN						
4	Snake		4			16	
5	Pine		0			10	
6	White		2			19	
7	Fish Springs		1			4	
8	Dugway		0			0	
9	Government Creek		0			4	
46	Sevier Desert		2			10	
46A	Sevier Desert & Dry Lake[5]		0			2	
54	Wah Wah		0			0	
137A	Big Smokey—Tonopah Flat		0			3	
139	Kobeh		0			4	
140A	Monitor—Northern		0			6	
140B	Monitor—Southern		0			3	
141	Ralston		1			3	
142	Alkali Spring		0			3	
148	Cactus Flat		0			3	
149	Stone Cabin[5]		3			13	
151	Antelope		0			1	
154	Newark[5]		0			6	
155A	Little Smoky—Northern		2			0	
155C	Little Smoky—Southern		2			1	
156	Hot Creek		1			21	
170	Penoyer		0			1	
171	Coal		0			5	
172	Garden		3			2	
173A	Railroad—Southern		1			0	
173B	Railroad—Northern		8			18	
174	Jakes[5]		0			8	
175	Long		0			4	
178B	Butte—South		0			1	
179	Steptoe		0			22	
180	Cave		1			6	
181	Dry Lake[5]		4			4	
182	Delamar		2			2	
183	Lake		2			4	
184	Spring		0			34	
196	Hamlin		0			4	
202	Patterson		0			2	
207	White River		0			5	
208	Pahroc		0			7	
209	Pahranagat		0			32	
	Overall DDA Impact						

3888-1

No impact.

Low impact (or abundance).

Moderate impact (or abundance).

High impact (or abundance).

[1]The abundance index is a best estimate based upon three major criteria: (1) known site densities, (2) predicted site densities, as indicated by historic aboriginal tribal distributions and water availability, and (3) general sensitivity, as indicated by preliminary field data.

[2]High (construction camp in subunit and/or extensive roadways in sensitive areas); moderate (construction camp in immediately adjacent subunit and/or moderate incursion of roadways in sensitive areas); low (not proximal to construction camp and/or little or no incursion of roadways in sensitive areas).

[3]The short-term impact rank is a best estimate based upon the relative proximity of known and predicted site areas to M-X construction areas, and to in-migrant population loci (construction camps and Area Support Centers).

[4]The long-term impact rank is a best estimate based upon the cumulative effects of construction plus the indirect effects projected during the operations phase. Key factors in the long-term disturbance are proximity to ASCs and the degree of public accessibility provided by the DTN and cluster roads in each subunit.

[5]Conceptual location of Area Support Centers (ASCs).

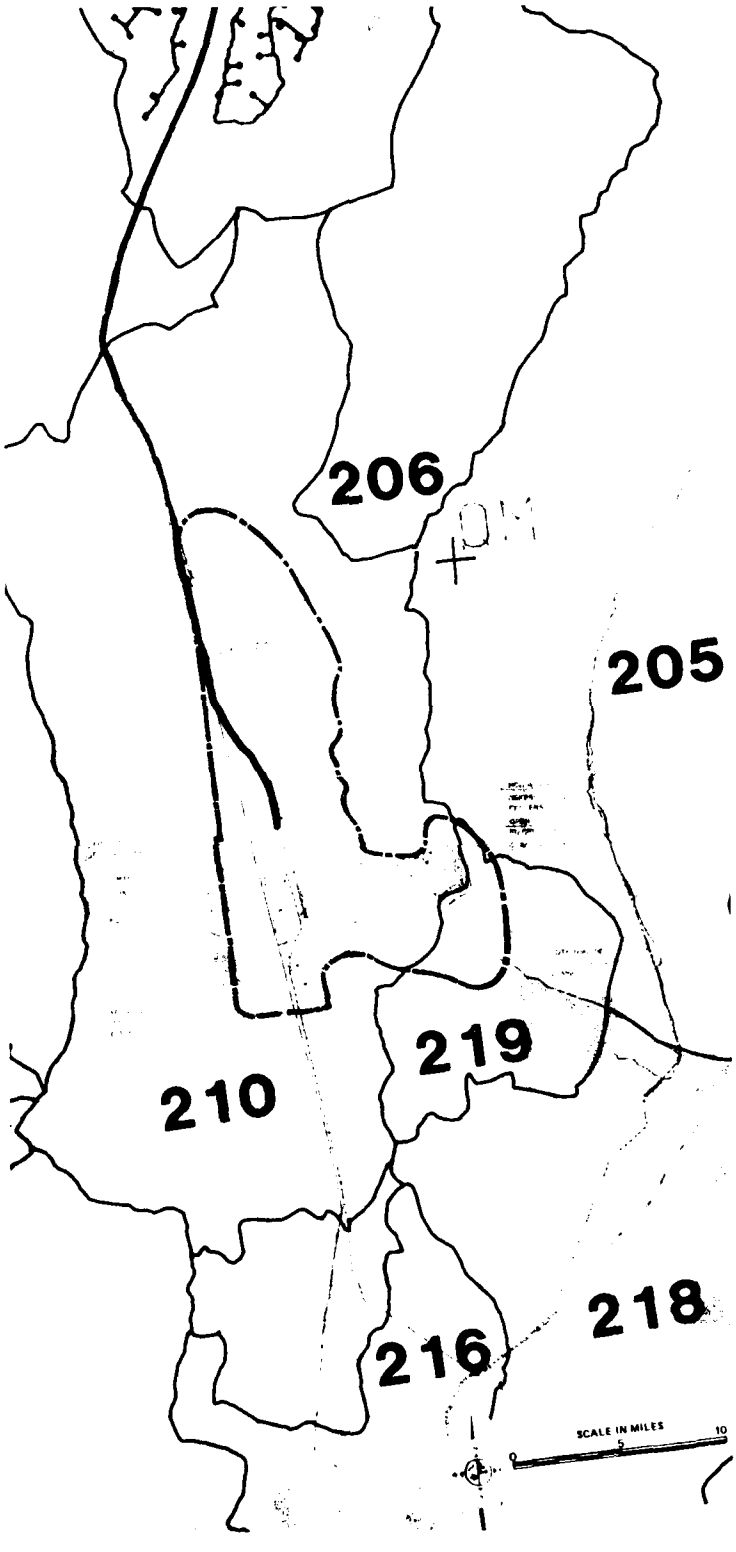


Figure 4.3.2.13-2. Native American sensitive sites and areas in the vicinity of Coyote Spring Valley.

Table 4.3.2.13-2. Potential impacts to Native American ancestral/sacred sites in the vicinity of Coyote Spring for the Proposed Action and for Alternatives 1, 2, 4 and 6.

HYDROLOGIC SUBUNIT		ABUNDANCE INDEX[1]	SHORT-TERM EFFECTS			LONG-TERM EFFECTS	
NO.	NAME		DIRECT IMPACT POTENTIAL[2]	INDIRECT IMPACT POTENTIAL[3]	POTENTIAL IMPACT[4]	NUMBER OF KNOWN SITES SUBJECT TO INDIRECT IMPACTS	POTENTIAL IMPACT[5]
	Hydrologic Subunit OB Location						
210	Coyote Spring					2	
219	Muddy River Springs					2	
	Other Affected Subunits[6]						
181	Dry Lake					8	
182	Delamar*					4	
205	Meadow Wash (OB RR Spur					0	
206	Kane Springs*					8	
209	Pahranagat*					32	
218	California Wash					1	
	Overall OB						

3889

No impact. Moderate impact (or abundance).

Low impact (or abundance). High impact (or abundance).

[1]Specific site data are scant for the Coyote Spring region. High site densities are expected throughout this region, however, on the basis of known historic Southern Paiute settlement and migration patterns.

[2]An estimate of direct impacts to unrecorded sites is based on relative proximity to construction activities. Hydrologic units with asterisks (*) are subject to direct impacts, with the exception of Alternative 4 (in which the DTN segment and OBTS are eliminated).

[3]An estimate of indirect short-term impacts is based on relative proximity to the construction camp associated with the OB.

[4]The short-term impact rank is an estimate of the combined effects of direct and indirect impact potentials.

[5]The long-term impact rank is an estimate of the cumulative effects of construction plus the indirect effects projected during the operations phase. Key factors in the long-term disturbance are proximity to the OB and the degree of public accessibility provided by the DTN and cluster roads in each subunit.

[6]Indirect effects are also expected in the adjacent Tikaboo-South (169B), Las Vegas (212), Hidden-North (217), Garnet (216), and Black Mountains (215) hydrologic units.

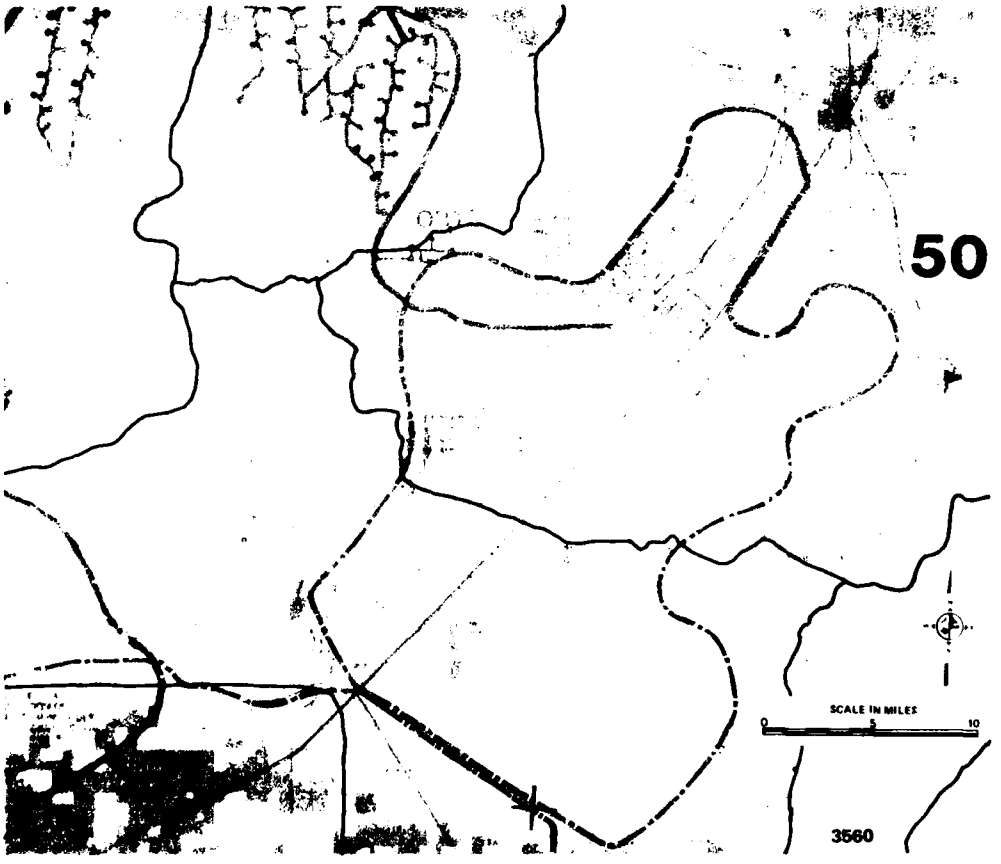


Figure 4.3.2.13-3. Native American sensitive sites and areas in the vicinity of Milford.

Table 4.3.2.13-3. Potential impact to Native American ancestral/ sacred sites in the vicinity of Milford for the Proposed Action and for Alternatives 5 and 6.

HYDROLOGIC SUBUNIT		ABUNDANCE INDEX[1]	SHORT-TERM EFFECTS			LONG-TERM EFFECTS	
NO.	NAME		DIRECT IMPACT POTENTIAL[2]	INDIRECT IMPACT POTENTIAL[3]	POTENTIAL IMPACT[4]	NUMBER OF KNOWN SITES SUBJECT TO INDIRECT IMPACTS	POTENTIAL IMPACT[5]
	Hydrologic Subunit OB Location						
50	Milford*					0	
52	Lund					3	
	Other Affected Subunits[6]						
4	Snake					20	
5	Pine					10	
6	White					21	
46	Sevier Desert					12	
46A	Sevier Desert & Dry Lake[7]					2	
53	Beryl-Enterprise District					7	
54	Wah Wah					0	
	Overall OB						

3890

[1] No impact. Low impact (or abundance). Moderate impact (or abundance). High impact (or abundance).

[1]Estimates on site densities are made on the basis of known historic Southern Paiute settlement and migration patterns.

[2]An estimate of direct impacts to known and predicted sites is based on relative proximity to construction activities. Hydrologic units noted with asterisks (*) have disparate effects for the Proposed Action (no impact is expected in Wah Wah due to the elimination of the DTN; only moderate direct effects are expected in Milford with the elimination of the DTN, OBTS and DAA).

[3]An estimate of indirect short-term impacts is based on relative proximity to the construction camp associated with the OB.

[4]The short-term impact rank is an estimate of the combined effects of direct and indirect impact potentials.

[5]The long-term impact rank is an estimate of the cumulative effects of construction plus the indirect effects projected during the operations phase. Key factors in the long-term disturbance are proximity to the OB and the degree of public accessibility provided by the DTN and cluster roads in each subunit.

[6]Indirect effects are also expected in the adjacent Dixie Creek-Tenmile Creek (48), Parowan (49) and Cedar City (51) hydrologic units, as well as in the Pahvant Mountains to the east.

[7]Conceptual location of Area Support Centers (ASCs).

No ancestral/sacred sites are recorded for the southern Escalante Desert region between Lund, and Modena is subject to direct construction impacts (see Figure 4.3.2.13-4). Historic data indicate this region was formerly exploited on a seasonal basis by Southern Paiute peoples for food gathering and for rabbit and antelope drives. Aboriginal campsites, if present, are most likely to occur along ephemeral streams which emanate from surrounding mountain areas.

As a rule, upper bajada and mountain areas hold the greatest potential for ancestral/sacred sites. Sites associated with Southern Paiutes are known in the Dixie National Forest, and for canyon and mountain areas between Modena and Hamblin Valley. The southern Needle and Wah Wah Ranges composed the former population center of the Indian Peaks band of Southern Paiutes, and dense site concentrations are likely throughout this mountain region. The anticipated increased recreational use of mountain areas adjacent to OB facilities during the construction and operations phases poses a substantial threat to the integrity of these resources, the majority of which are presently unrecorded (see Table 4.3.2.13-4).

Potential mitigation measures include preconstruction surveys of proposed disturbance areas within the suitability zone that include the participation of representatives from federal and state agencies, the Cedar City, Indian Peaks and Shivwits bands of Southern Paiutes and coordination of suitable mitigation measures with the respective governments of these bands.

ALTERNATIVE 2 (4.3.2.13.1.4)

The Delta OB suitability zone falls within one of the most densely settled aboriginal areas in the Utah siting area. The Sevier and Beaver Rivers supported permanent fishing villages associated with the Western Ute in prehistoric and historic times. Areas adjacent to these rivers were utilized for gathering and hunting activities on a seasonal basis, and are expected to contain numerous campsites. Although site density is predicted to be high within the Delta suitability zone, Native American cultural resources in this area remain undocumented. Known sites are limited to several lithic scatters and campsites which lie east of Highway 50 in close proximity to the railroad spur linking the OB to the Union Pacific line. Site densities in the suitability zone are expected to be greatest within a 2 mi radius of the Sevier and Beaver Rivers (see Figure 4.3.2.13-5). Tier Two surveys are anticipated to identify many Native American ancestral/sacred sites.

The larger northern Sevier Desert area contains a wide variety of significant Native American cultural resources which are subject to indirect impacts associated with population in-migration (see Table 4.3.2.13-5). Historic Ute villages are documented for Deseret and nearby Lynndyl, Holden, Kanosh, Scipio, and Black Rock. Additional settlements are known for the Sevier Lake region just south of the OB area. Important rock art sites also fall within the radius of potential indirect impacts. Four petroglyph sites are located in the lava flows just south of Delta, and additional sites occur to the north in the Simpson and Sheeprock Mountains. Southern Paiute Indians residing at Kanosh and Richfield have expressed concern to the U.S. Forest Service for burials located in the Pahvant Mountains west of the OB siting area. The population influx associated with base development, along with the simultaneous development of the Intermountain Power Project at nearby Lynndyl, may lead to even greater demands on the Forest Service for increased recreational development of wilderness or roadless areas in which sensitive Native American resources are concentrated.

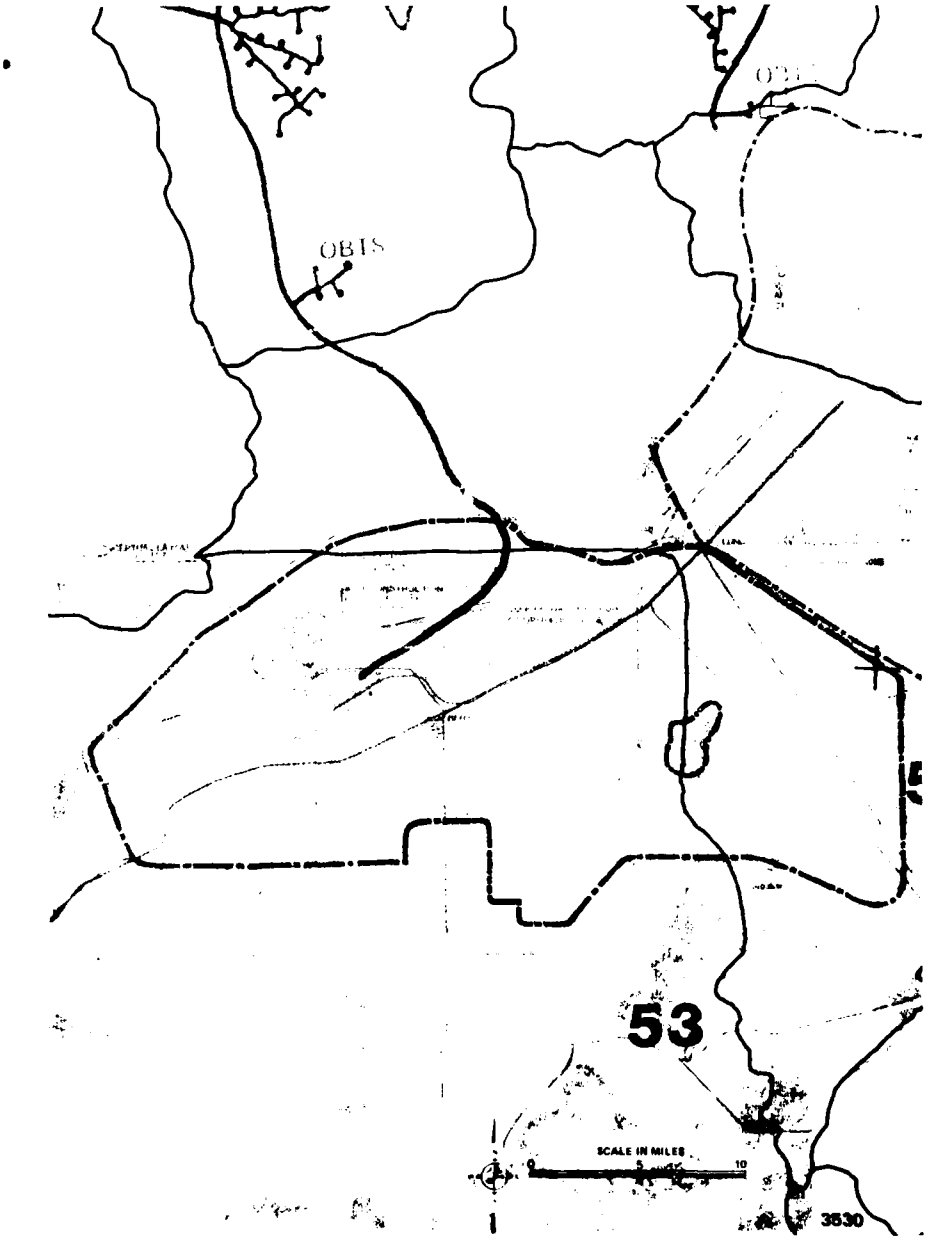


Figure 4.3.2.13-4. Native American sensitive sites and areas in the vicinity of Beryl.

Table 4.3.2.13-4. Potential impact to Native American ancestral/sacred sites in the vicinity of Beryl for Alternatives 1, 3 and 4.

HYDROLOGIC SUBUNIT		ABUNDANCE INDEX[1]	SHORT-TERM EFFECTS			LONG-TERM EFFECTS	
NO.	NAME		DIRECT IMPACT POTENTIAL[2]	INDIRECT IMPACT POTENTIAL[3]	POTENTIAL IMPACT[4]	NUMBER OF KNOWN SITES SUBJECT TO INDIRECT IMPACTS	POTENTIAL IMPACT[5]
	Hydrologic Subunit OB Location						
52	Lund*					3	
53	Beryl-Enterprise*					7	
	Other Affected Subunits[6]						
5	Pine*					10	
50	Milford					0	
54	Wah Wah					0	
198	Dry					7	
199	Rose					4	
200	Eagle					5	
201	Spring					9	
203	Panaca					9	
204	Clover					31	
	Overall OB						

3891

[1] No impact. Low impact (or abundance). Moderate impact (or abundance). High impact (or abundance).

[1]Estimates on site densities are made on the basis of known historic Southern Paiute settlement and migration patterns as well as on recorded sites.

[2]An estimate of direct impacts to known and predicted sites is based on relative proximity to construction activities. Hydrologic units noted with asterisks (*) have disparate effects for Alternative 1 (no direct impacts will occur in Pine Valley due to elimination of the DTN; no direct impacts will occur in Lund District due to elimination of the DTN and OBTS; impacts will be slightly less in Beryl-Enterprise due to elimination of the DTN segment).

[3]An estimate of indirect short-term impacts is based on relative proximity to the construction camp associated with the OB.

[4]The short-term impact rank is an estimate of the combined effects of direct and indirect impact potentials.

[5]The long-term impact rank is an estimate of the cumulative effects of construction plus the indirect effects projected during the operations phase. Key factors in the long-term disturbance are proximity to the OB and the degree of public accessibility provided by the DTN and cluster roads in each subunit.

[6]Indirect effects are also expected in the adjacent Cedar City (51) and Parowan (49) hydrologic units, and in the Dixie National Forest to the south.

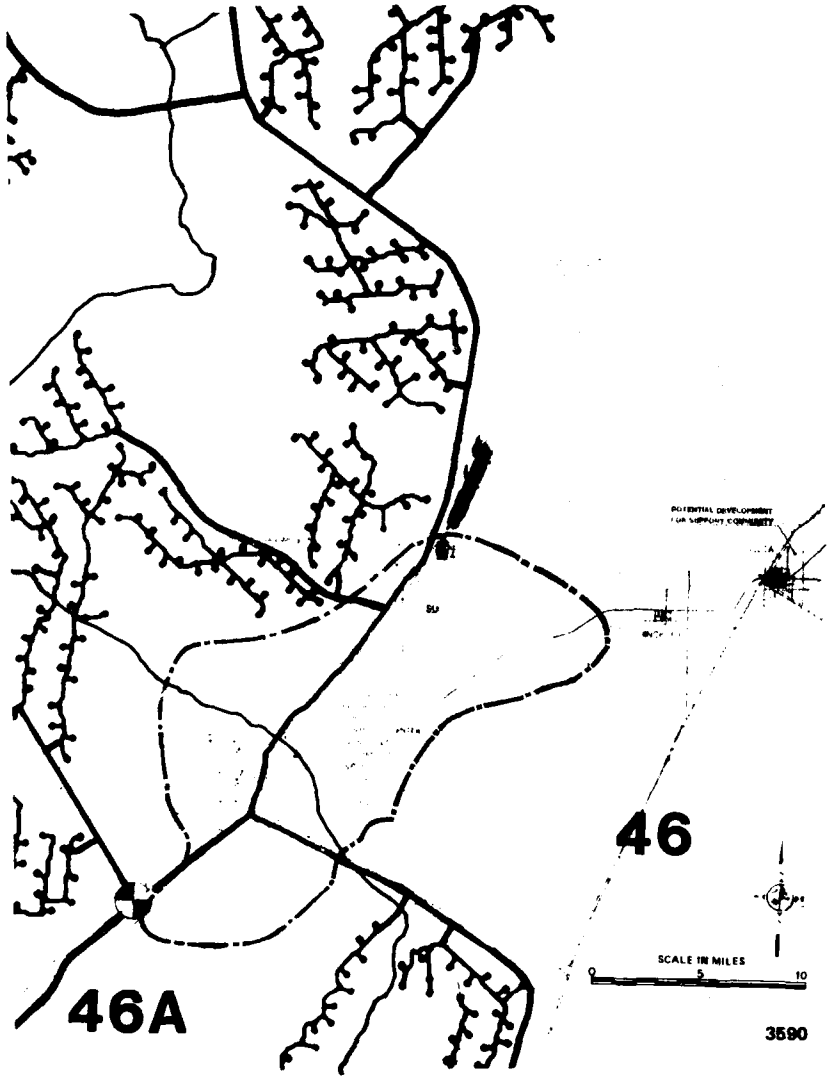


Figure 4.3.2.13-5. Native American sensitive sites and areas in the vicinity of Delta.

Table 4.3.2.13-5. Potential impact to Native American ancestral/ sacred sites in the vicinity of Delta for Alternative 2.

HYDROLOGIC SUBUNIT		ABUNDANCE INDEX[1]	SHORT-TERM EFFECTS			LONG-TERM EFFECTS	
NO.	NAME		DIRECT IMPACT POTENTIAL[2]	INDIRECT IMPACT POTENTIAL[3]	POTENTIAL IMPACT[4]	NUMBER OF KNOWN SITES SUBJECT TO INDIRECT IMPACTS	POTENTIAL IMPACT[5]
	Hydrologic Subunit OB Location						
46	Sevier Desert					12	
46A	Sevier Desert & Dry Lake[7]					2	
	Other Affected Subunits[6]						
6	White					21	
7	Fish Springs Flat					5	
8	Dugway					0	
9	Government Creek					4	
54	Wah Wah					0	
	Overall OB						

3892

[1] No impact. Low impact (or abundance). Moderate impact (or abundance). High Impact (or abundance).

[1]Native American sites in the Delta area and adjacent hydrologic units are not well documented. Estimates of site abundance are based on known sites as well as known historic distributions of Goshute, Ute, and Southern Paiute Indians.

[2]An estimate of direct impacts to known and predicted sites is based on relative proximity to construction areas.

[3]An estimate of indirect short-term impacts is based on relative proximity to the OB construction camp.

[4]The short-term impact rank is an estimate of the combined effects of direct and indirect impact potentials.

[5]The long-term impact rank is an estimate of the cumulative effects of construction plus the indirect effects projected during the operations phase. Key factors in the long-term disturbance are proximity to the OB, the degree of public accessibility, and the presumed attraction to higher elevation areas for recreation.

[6]Indirect effects are also expected in the Fishlake National Forest east of Delta.

[7]Conceptual location of Area Support Centers (ASCs).

Mitigative measures appropriate to the Delta OB include extensive preconstruction survey of proposed disturbance areas, and consultation with local Southern Paiutes at the Kanosh Reservation.

ALTERNATIVE 3 (4.3.2.13.1.5)

Predicted impacts to significant Native American cultural resources in the DDA are identical to those indicated for the Proposed Action.

The Beryl OB discussion in Alternative 1 is also relevant to Alternative 3, with the following addendum. As a primary base, the Beryl site will involve additional ground disturbance in lowland regions for construction of the DAA and OBTS, thereby increasing the likelihood of direct impacts to ancestral habitation sites. Highest disturbance potential, however, is associated with construction of the DTN which links the DAA and OBTS with missile clusters in Pine Valley. The DTN will proceed through pristine areas of a major mountain pass known to be associated with dense aboriginal settlements. Similarly, the DTN route flanks the eastern foothills of the Needle Range in Pine Valley, which includes the former population center of the Indian Peaks band of Southern Paiutes. This area has high sensitivity for contemporary peoples and is associated with significance resources of both a secular and sacred nature which continue to be used in the traditional manner. Three suitability zones are associated with the Ely OB (two immediately north of the city of Ely in central Steptoe Valley, and one south of Ely in the southern portion of the valley). Suitability zones north of Ely are known to have been densely settled by Shoshones in prehistoric and historic times (see Figure 4.3.2.13-6). Large winter settlements were located near Ely, Grass Springs, and Warm Springs. Numerous campsites associated with seasonal subsistence pursuits are likely to occur throughout the valley floor and surrounding foothill areas. The suitability zone just north of Ely also contains a traditional ceremonial site, which is still used by contemporary Shoshones. Areas north of Ely are expected to be very sensitive to local Native Americans.

For the Ely OB suitability zone south of Ely, the greatest potential for adverse impacts to Shoshone cultural resources lies in the lower and upper bajadas of the Egan Range. This area contains abundant springs and traditional foods (pine-nuts, game), and is likely to be associated with ancestral settlements, burial grounds, and other sacred features. Lowland regions of the suitability zone are expected to be less sensitive, comparatively. The valley floor, however, contains the confluence of several ephemeral mountain streams, including the larger Willow Creek Drainage. Seasonal Shoshone campsites associated with gathering activities and rabbit-drives have a high probability of occurrence in this area.

Due to the dense Shoshone settlement of Steptoe Valley and adjacent Spring Valley in prehistoric and historic times, the indirect impacts to ancestral/sacred sites which typically accompany substantial population in-migration may be extensive in the long-term (see Table 4.3.2.13-6). A preconstruction survey of all potential disturbance areas, involving the active participation of Shoshones from Ely Colony, would be expected to identify specific sites which are culturally significant to contemporary peoples.

ALTERNATIVE 4 (4.3.2.13.1.6)

Predicted impacts to significant Native American cultural resources in the DDA and in the area of the Beryl OB are identical to those indicated in the Proposed Action and in Alternative 3, respectively.

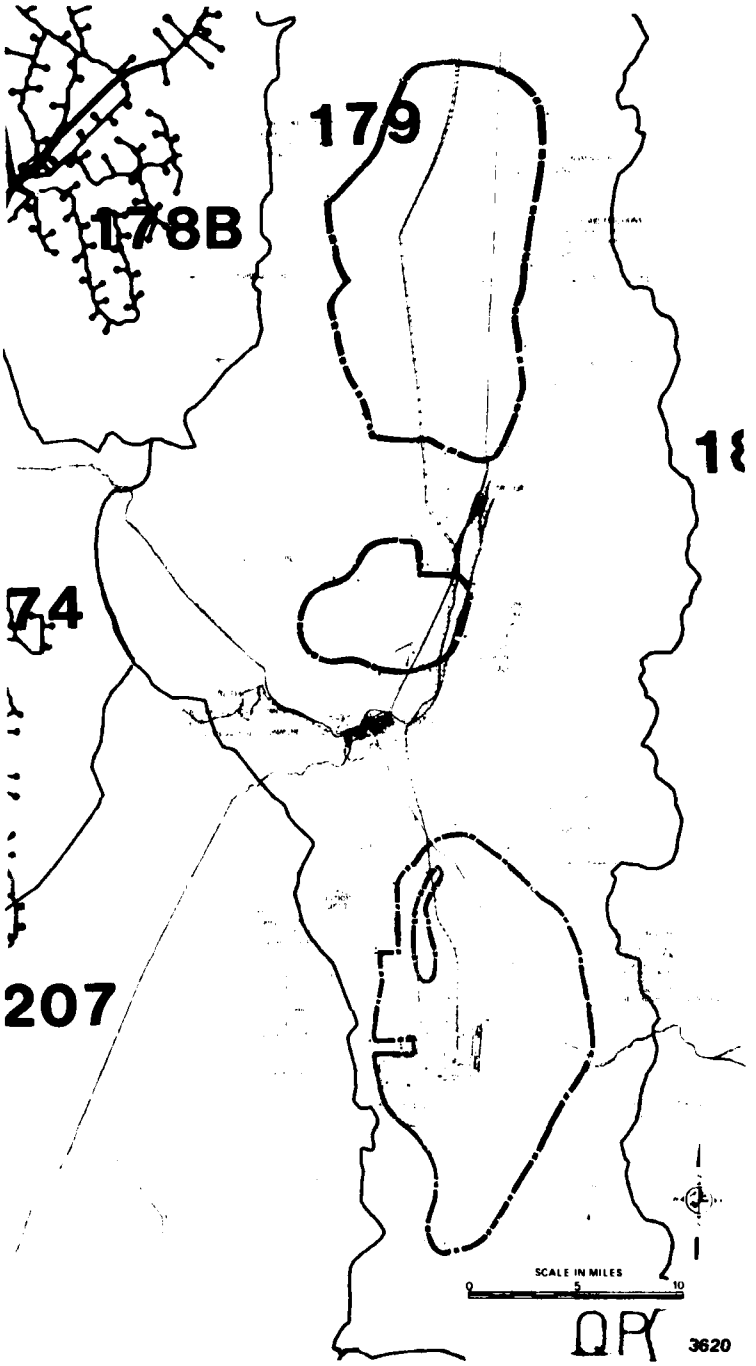


Figure 4.3.2.13-6. Native American sensitive sites and areas in the vicinity of Ely.

Table 4.3.2.13-6. Potential impact to Native American ancestral/sacred sites in the vicinity of Ely for Alternatives 4 and 5.

HYDROLOGIC SUBUNIT NO.	HYDROLOGIC SUBUNIT NAME	ABUNDANCE INDEX[1]	SHORT-TERM EFFECTS: DIRECT IMPACT POTENTIAL[2]	SHORT-TERM EFFECTS: INDIRECT IMPACT POTENTIAL[3]	SHORT-TERM EFFECTS: POTENTIAL IMPACT[4]	LONG-TERM EFFECTS: NUMBER OF KNOWN SITES SUBJECT TO INDIRECT IMPACTS	LONG-TERM EFFECTS: POTENTIAL IMPACT[5]
	Hydrologic Subunit OB Location						
179	Steptoe					1	
	Other Affected Subunits						
4	Snake					20	
174	Jakes[6]					8	
178B	Butte—South					1	
180	Cave					7	
184	Spring					34	
207	White River					5	
	Overall OB						

3893

[1] No impact. Low impact (or abundance). Moderate impact (or abundance). High impact (or abundance).

[1]The Steptoe Valley region is known to have been a major population center for the Shoshone. Recorded sites represent only a small fraction of the total resource base. Estimates of site abundance are based on these known sites, as well as on known historic distributions of Shoshone Indians.

[2]An estimate of direct impacts to known and predicted sites is based on relative proximity to construction areas.

[3]An estimate of indirect short-term impacts is based on relative proximity to the OB construction camp.

[4]The short-term impact rank is an estimate of the combined effects of direct and indirect impact potentials.

[5]The long-term impact rank is an estimate of the cumulative effects of construction plus the indirect effects projected during the operations phase. Key factors in the long-term disturbance are proximity to the OB, the degree of public accessibility, and the presumed attraction to higher elevation areas for recreation.

[6]Conceptual location of Area Support Centers (ASCs).

The discussion of the Coyote Spring OB area in the Proposed Action is also relevant to Alternative 4, with the following difference. Of all the OB alternatives, Coyote Spring has the greatest impact potential to known Native American cultural resources. Utilization of the Coyote Spring site for a secondary base, and hence the elimination of the DAA and OBTS, will substantially reduce the magnitude of direct impacts to ancestral/sacred sites, particularly in the areas of Pahranagat Wash, Kane Springs Wash and the Lower Pahranagat Valley. No significant change is seen, however, in the level of indirect impacts.

ALTERNATIVE 5 (4.3.2.13.1.7)

Predicted impacts to significant Native American cultural resources in the DDA and in the area of the Ely OB are identical to those indicated for the Proposed Action and for Alternative 3, respectively.

The discussion of the Milford OB area in the Proposed Action is also relevant to Alternative 5, with the following addendum. Utilization of the Milford siting area for a primary OB will result in a significant increase in ground disturbance for construction of the DAA and associated railroad spur, OBTS, and the DTN which links these two facilities to missile clusters in the Wah Wah Valley. No site specific data on significant Native American cultural resources are available for these areas of potential direct impacts. The probability of Southern Paiute campsites in the southwestern portion of the suitability zone is moderate to high, particularly in the area of ephemeral streams which emanate from the White Mountain area. In addition, proposed placement of the OBTS facility penetrates forested zones, where aboriginal settlements and burials are more likely. Tier Two environmental survey will increase the available information for impact assessment.

ALTERNATIVE 6 (4.3.2.13.1.8)

Predicted impacts to significant Native American cultural resources in the DDA are identical to those indicated for the Proposed Action.

Alternative 6 combines the primary base site at Milford with the secondary base site at Coyote Spring. Discussions relevant to the Milford OB are the same as the Proposed Action and Alternative 5. For potential impacts relevant to Coyote Spring, see the Proposed Action and Alternative 4.

ALTERNATIVE 7 (4.3.2.13.1.9)

From the perspective of significant Native American cultural resources, Alternative 7 appears to have the least potential for negative impacts on the material heritage and traditional lifestyles of contemporary Indian peoples. No direct impacts to known aboriginal habitation or sacred sites are indicated in the DDA or suitability zones of the Clovis and Dalhart OB sites. The paucity of known sites attributable to the ancestors of modern Apache, Kiowa, Kiowa-Apache, and Comanche peoples is due, in part, to historical factors. The introduction of the horse in the 17th century by Spaniards precipitated the development of highly mobile Indian societies. Although equestrianism permitted the evolution of individual bands into large communities, the frequent movement necessitated by hunting and warfare favored the development of highly portable dwellings and other utilitarian artifacts. This settlement pattern greatly reduced the material evidence

of former habitation. Moreover, due to the similarity of artifacts utilized by deployment area tribal groups, and frequent trade among them, the ethnic affiliation of known sites cannot be identified with any certainty.

The relative cultural significance attached to potential resources in the Texas/New Mexico area by contemporary Indians is also unknown. Apache, Kiowa, Kiowa-Apache, and Comanche peoples native to lands in the DDA have been established on reservations in Oklahoma and central New Mexico for over a century. Thus the geographical and cultural continuity with ancestral lands and sacred features which characterizes Nevada/Utah Indian tribes is less pronounced.

Historic land use is a third factor relevant to the intensity of cultural resource impacts. Whereas the major portion of the Nevada/Utah DDA is disturbed only by grazing, the Texas/New Mexico DDA has been intensively utilized for agricultural and ranching purposes for the past century. This division of land areas into private holdings restricted the continuation of Indian usage and accelerated the disturbance of existing Native American cultural resources through development. The cumulative effect of Indian removal and non-Indian land appropriation has been a comparative reduction in the overall cultural significance assigned by contemporary Native Americans to resources in the Texas/New Mexico DDA.

ALTERNATIVE 8 (4.3.2.13.1.10)

There are no known impacts to significant Native American cultural resources in the Texas/New Mexico DDA. For further discussion, see Alternative 7.

The Nevada/Utah half of the Alternative 8 DDA includes 24 of the 37 valleys included in the Proposed Action. These valleys contain 212 known ancestral/sacred sites, 17 of which are within 1 mi of the representative placement of protective shelters, cluster roads, and the DTN (see Figure 4.3.2.13-7). The Alternative 8 DDA valleys are ranked according to predicted resource abundance and short- and long-term impact potentials in Table 4.3.2.13-7.

The impacts of Alternative 8 on known Native American cultural resources are considerably less than those projected for the Proposed Action. The difference stems from the reduction of deployment area valleys in Nevada/Utah from 37 to 24, and the corresponding substitution of Texas/New Mexico lands where cultural resources are less densely distributed, and where historical factors have contributed to a decrease in Native American sensitivity regarding these resources. Due to the strong cultural ties maintained by Shoshone and Southern Paiute Indians, any reduction in the land area utilized for deployment in Nevada/Utah will have a positive effect by reducting cultural resource impacts. A common feature of all Nevada/Utah alternatives is the unequal burden placed on specific tribal groups with respect to the potential loss of material and spiritual resources central to cultural persistence. An assessment of project effects must take into consideration not only impacts to specific sites of concern to Native Americans, but the cumulative effects of significant resource loss on the survival of traditional cultural systems.

The Coyote Spring OB in Alternative 8, as noted in the discussion of the Proposed Action, has the greatest potential of all base options for negative impacts on ancestral/sacred sites and features. The Clovis OB is discussed in Alternative 7.

Table 4.3.2.13-7. Potential impacts to Native American ancestral/ sacred sites in Nevada/Utah split basing DDA Alternative 8.

HYDROLOGIC SUBUNIT		ABUNDANCE INDEX[1]	SHORT-TERM EFFECTS			LONG-TERM EFFECTS	
NO.	NAME		NUMBER OF DIRECT IMPACTS TO KNOWN SITES	INDIRECT IMPACT POTENTIAL[2]	POTENTIAL IMPACT[3]	NUMBER OF KNOWN SITES SUBJECT TO INDIRECT IMPACTS	POTENTIAL IMPACT[4]
	Subunits with M-X Clusters and DTN						
4	Snake		3			17	
5	Pine		0			10	
6	White		0			21	
7	Fish Springs		0			5	
46	Sevier Desert		0			12	
46A	Sevier Desert & Dry Lake[5]		0			2	
54	Wah Wah		0			0	
155C	Little Smoky—Southern		2			3	
156	Hot Creek		1			21	
170	Penoyer		0			1	
171	Coal		0			5	
172	Garden		3			2	
173	Railroad S & N		1			0	
180	Cave		0			7	
181	Dry Lake[5]		4			4	
182	Delamar		2			2	
183	Lake		2			4	
184	Spring		0			34	
196	Hamlin		0			4	
202	Patterson		0			2	
207	White River		0			5	
	Overall DDA						

3894

[1]

No impact. Moderate impact (or abundance).

Low impact (or abundance). High impact (or abundance).

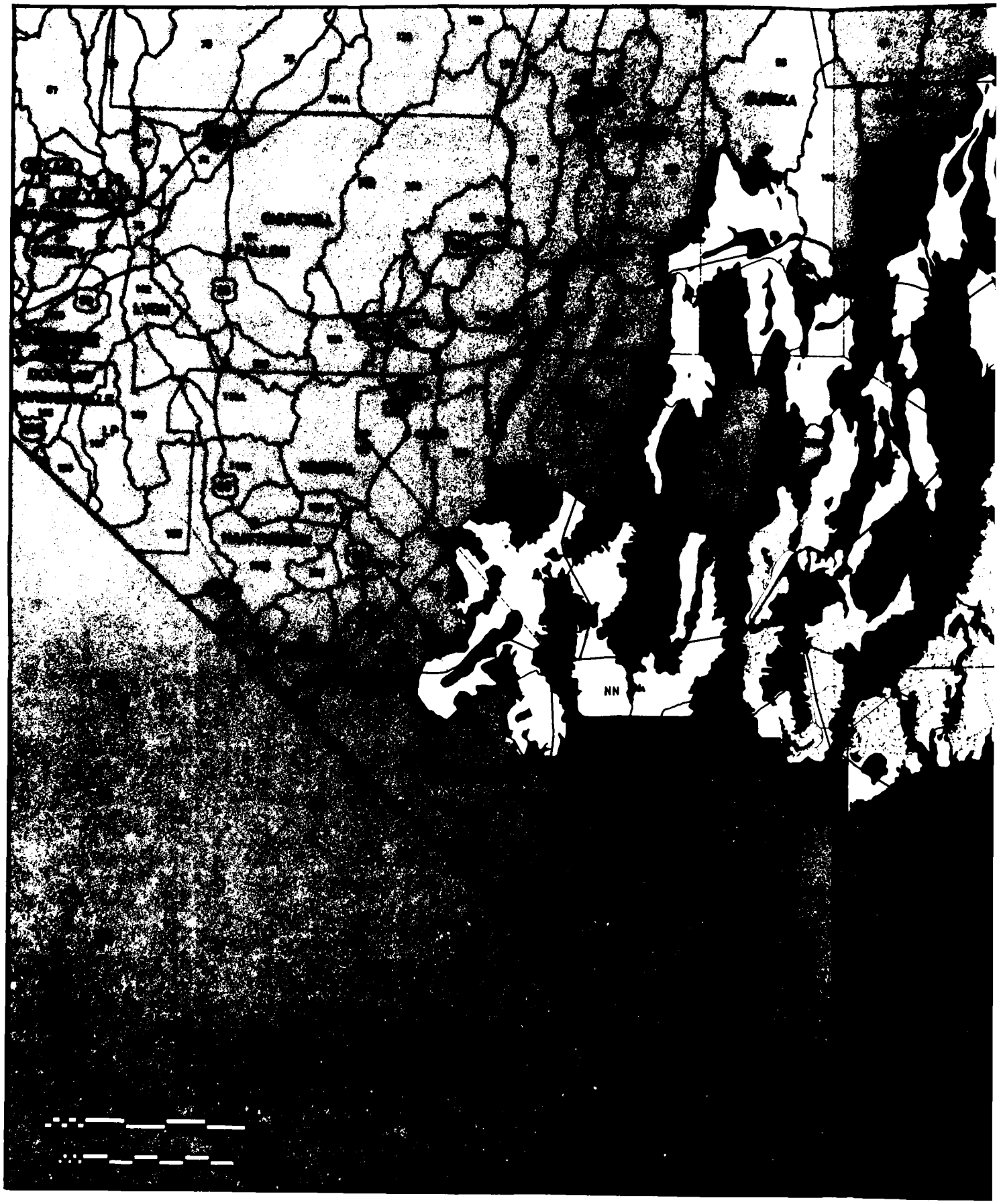
[1]The abundance index is a best estimate based upon three major criteria: (1) known site densities, (2) predicted site densities, as indicated by historic aboriginal tribal distributions and water availability, and (3) general sensitivity, as indicated by preliminary field data.

[2]Very high (within 50 mi of the Coyote Spring OB); high (construction camp or other projects located in subunit); moderate (construction camp or other project located in immediately adjacent subunit); low (not proximal to OB, construction camp, or other project).

[3]The short-term impact rank is a best estimate based upon the relative proximity of known and predicted site areas to M-X construction areas, and to in-migrant population loci (OBs, construction camps, and other proposed project locations).

[4]1= high, 2= moderate, 3= low. The long-term impact rank is a best estimate based upon the cumulative effects of construction plus the indirect effects projected during the operations phase. Key factors in the long-term disturbance are proximity to the Coyote Spring OB and the degree of public accessibility provided by the DTN and cluster roads in each subunit.

[5]Conceptual location of Area Support Centers (ASCs).


NN


UT
NEVL

WATER ACCESSIBILITY AND AGRICULTURAL LAND USE

INTRODUCTION (4.3.2.13.2.1)

For Native Americans in the Great Basin, access to water and productive land is the key to economic survival and their persistence as a distinct people in their ancestral lands. Water resources important to the economy of Native Americans in the region have been identified. Where project needs for water potentially compete with Native American present economic needs and future development needs, the impact of the project is judged significant.

PROPOSED ACTION (4.3.2.13.2.2)

DDA Impacts

Potential impacts to Native American water accessibility and land use under the proposed action DDA follow from the requirements of construction in an arid land. These impacts could occur in the Railroad (173 A&B) and Little Smoky (155 A, B&C) valleys surrounding the Duckwater Reservation and its BLM permit grazing lands. Impacts could also be felt at the Moapa Reservation which is dependent on water from Muddy River Spring and the valleys belonging to the White River drainage system. These are: primarily Coyote Spring (210) and Kane Springs Valley (206) and secondarily Dry Lake Valley (181), Delamar Valley (182), Pahranagat Valley (209), Pahroc Valley (208), Coal Valley (171), Garden Valley (172), White River Valley (207), Cave Valley (180), Jakes Valley (174), and Long Valley (175) (Eakins, 1966). (Table 4.3.2.13-8, Figure 4.3.2.13-8).

In the valleys surrounding the Duckwater Reservation 12,600 acre-ft will be required, 8,400 of which is required for Railroad Valley. It is unlikely that these area requirements would have any significant effect on valley and regional water resources. Short-term localized effects on Duckwater Reservation irrigation and stock watering springs and wells could occur, however, if M-X construction water extraction were to occur sufficiently close to existing wells and springs to lower the water table diminishing supplies and lowering the productivity of irrigated land and that of cattle herds. If construction were to coincide with a cycle of climatically dry years, this impact could be very significant.

Recovery would follow a few weeks or months after such pumping ceased, as water table levels returned to normal. Longer term damage is not expected. Such damage would occur if a temporary localized drawdown of the water table disrupted the underlying structure of springs and shallow wells such that recovery could not occur.

These possible impacts on the Duckwater Reservation are avoidable if care is taken to locate M-X construction wells sufficiently distant from Duckwater water sources so as to avoid any impact due to excessive drawdown.

Construction demands in the White River drainage will be spread over several construction groups and it is anticipated that little effect would be felt at the discharge of Muddy River Springs unless construction coincides with a series of years of less than normal precipitation. Discharge at Muddy River Springs, and the perennial yield of the lower White River drainage (Coyote Spring, Kane Springs, Muddy River Springs), is a relatively constant 36,000 acre-ft/year. Removal of groundwater within the White River drainage (without natural recharge) would ultimately be felt at the Muddy River Springs. Reduction in flow at Muddy River Springs would hinder agriculture at the Moapa Reservation (water usage there is 6.8 times state decrees) and reduce their plans to develop a 70,000 acre proposed reservation expansion. The Moapa Reservation presently diverts 12 cfs from the Muddy River, fully 24 percent of the discharge of the Muddy River Springs, 26 percent of the streamflow of the Muddy River at Moapa (Table 4.3.2.13-9).

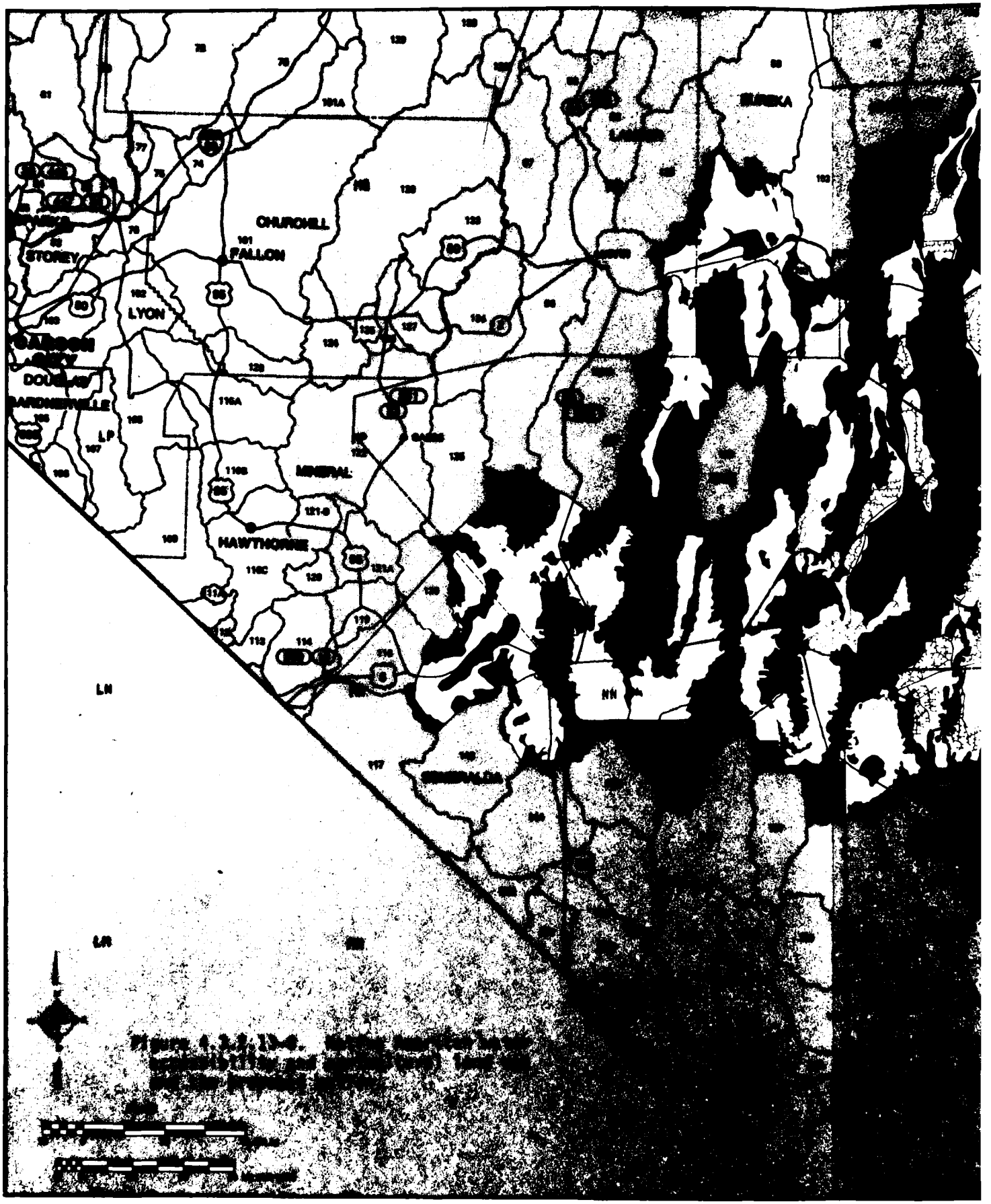
To mitigate this potential impact, care should be taken to adjust groundwater pumping in the drainage to climactic conditions. This would avoid any short-term threat to the Muddy River Springs.

Coyote Spring Valley OB Impacts

The proposed action operating base at Coyote Spring (Figure 4.3.2.13-8) would directly affect the water flow of the Muddy River and indirectly impact Moapa Reservation present and pending agricultural land resources. Water demands for the operation of the base at Coyote Spring would be about 4,000 acre-ft per year, peak demands would be as high as 4,400 acre-ft/year. When this usage is combined with construction demands of clusters upstream in the White River drainage system up to 10,500 acre-ft/yr of groundwater could be used during the short-term construction years. This utilization could significantly affect the flow of the Muddy River Spring and the Muddy River, the lower outlet for the White River drainage, with a total flow of 36,000 (Table 4.3.2.13-9) acre-ft per year. This discharge is the long term perennial yield of the Coyote Spring, Kane Springs and Muddy River Spring units.

During the long term, operations at the base would require removal of 4,000 acre-ft/year at Coyote Spring for 30 years of operation which would directly reduce the flow of Muddy River Springs for the life of the base. Total recharge in the Coyote Spring, Kane Springs, and Muddy River Springs areas combined from precipitation alone is only 2,600 acre ft/year.

Under existing conditions the Muddy River Springs are fed by groundwater originating in the Coyote Spring, Kane Springs, Pahroc, Pahranagat, Dry Lake, Delamar, White River, Long, Jakes, Cave, Garden, and Coal valleys. Flow at the


EUREKA
CHURCHILL
FALLON
STOREY
LYON
MINERAL
HAWTHORNE
LN
HN
LR


MT
BERYL
LEGEN
DAA SUIT
181
HYDROL
OB SUIT
CONCE
CONCE

Table 4.3.2.13-8. Potential impact to Native American water accessibility and land use in the Nevada/ Utah DDA for the Proposed Action and Alternatives 1-6.

HYDROLOGIC SUBUNIT NO.	HYDROLOGIC SUBUNIT NAME	NATIVE AMERICAN DEPENDENCE ON WATER RESOURCES[1]	ESTIMATED OVERALL SHORT-TERM IMPACT	ESTIMATED OVERALL LONG-TERM IMPACT[1]
	Subunits with M-X Clusters and DTN			
4	Snake			
5	Pine			
6	White			
7	Fish Springs			
8	Dugway			
9	Government Creek			
46	Sevier Desert			
46A	Sevier Desert & Dry Lake[2]			
54	Wah Wah			
137A	Big Smoky-Tonopah Flat			
139	Kobeh			
140A	Monitor—Northern			
140B	Monitor—Southern			
141	Ralston			
142	Alkali Spring			
148	Cactus Flat			
149	Stone Cabin[2]			
151	Antelope			
154	Newark[2]			
155A	Little Smoky—Northern			
155C	Little Smoky—Southern			
156	Hot Creek			
170	Penoyer			
171	Coal			
172	Garden			
173A	Railroad—Southern			
173B	Railroad—Northern			
174	Lakes[2]			
175	Long			
178B	Butte—South			
179	Steptoe			
180	Cave			
181	Dry Lake[2]			
182	Delamar			
183	Lake			
184	Spring			
196	Hamlin			
202	Patterson			
207	White River			
208	Pahroc			
209	Pahranagat			
	Other Affected Subunits			
210	Coyote Springs			
219	Muddy River Springs			
	Overall DDA Impact			

3837

[1]Degree of Native American dependence on the water resource. Also, the level of potential impact on present or future Native American productivity.

None.
Low.
Moderate.
High.

[2]Conceptual location of Area Support Centers (ASCs).

Table 4.3.2.13-9. Potential impact to Native American water accessibility and land use in the Coyote Spring operating base suitability area for the Proposed Action and Alternatives 1, 2, 4, 6 and 8.

HYDROLOGIC SUBUNIT NO.	HYDROLOGIC SUBUNIT NAME	NATIVE AMERICAN DEPENDENCE ON WATER RESOURCES[1]	OVERALL SHORT-TERM IMPACT	OVERALL LONG-TERM IMPACT[1]
	Subunits within the OB Suitability Area			
210 219	Coyote Springs Muddy River Springs			
	Other Affected Subunits			
171 172 174 175 180 181 182 207 208 209	Coal Garden Jakes[2] Long Cave Dry Lake[2] Delamar White River Pahroc Pahranagat			
	Overall OB (White River Drainage)			

3838

[1]Degree of Native American dependence on the water resource. Also the level of potential impact on present or future Native American resource use.

None.
Low.
Moderate.
High.

[2]Conceptual location of Area Support Center (ASC).

Muddy River Springs is relatively constant and feeds the agricultural, stock raising, domestic and craft needs of the Moapa Reservation as well as those of other users in the Muddy Valley. The Moapa Reservation presently diverts 12 cfs from the Muddy River, fully 24 percent of the discharge of the Muddy River Springs (26 percent of the streamflow of the Muddy River at Moapa). Water use on the reservation is already 6.8 times that allotted under state decree. A reduction in the flow of the Muddy River Springs would directly reduce Moapa access to water and diminish present and planned economic activities (especially greenhouse horticulture and cattle operations). A reduction in the flow of the Muddy River would also limit water available for the development of the Moapa Reservation expansion. Water for these expansion lands would be available after the demands of more senior users are met. Depletion of the groundwater upstream, including a short- or long-term lowering of the water table, would have a corresponding effect on the productivity of the Muddy River Springs (Table 4.3.2.13-9).

Mitigation of the water problem at Coyote Spring can best be dealt with by avoidance. Avoidance could take the form of purchases of surplus water from Las Vegas covering construction, and operation needs during the lifetime of the base. This would relieve any stress on local groundwater resources. Treated wastewater from the base could then be a resource itself, helping to improve regional groundwater resources or used for agriculture, especially by the Moapa who face a water deficit in developing their proposed expansion.

Other than by avoidance, mitigation would be accomplished on the operating base and in residential communities associated with the base by the adoption of a strict water regime to minimize use: landscaping with native plants that require no irrigation, rejection of plans for watered recreational areas, flow restrictions on showers, automatic faucet shutoffs, the use of waterless toilets, and minimum possible use of water for health and hygiene. These strategies could reduce base water consumption to a low level.

Milford OB Impacts

There are no identified Native American lands or water resources in the Milford, Utah, vicinity. Possible competition exists between M-X land withdrawals and Utah Southern Paiute withdrawals. Consultation with the BIA and the Utah Southern Paiutes will avoid this competition

ALTERNATIVE 1 (4.3.2.13.2.3)

Since the DDA of the Proposed Action and that of Alternative 1 are identical the possible effects on Native American agricultural land and water resources are the same (Figure 4.3.2.13-8).

The Proposed Action base at Coyote Spring is the same as for Alternative 1. See that section for possible impacts.

The Alternative 1 operating base at Beryl, Utah, does not impact any identified Native American land or water resources. The potential exists for competition between M-X land withdrawals and Utah Southern Paiute land withdrawals. Consultation with the BIA and the Utah Southern Paiutes will avoid this competition.

ALTERNATIVE 2 (4.3.2.13.2.4)

The DDA of the Proposed Action and that of Alternative 2 are identical, and so are its possible effects on Native American agricultural land and water resources.

The Proposed Action base at Coyote Spring is the same as for Alternative 2. See that section for possible impacts.

The Alternative 2 operating base at Delta, Utah, does not impact any identified Native American land or water resources. The potential exists for competition between M-X land withdrawals and Utah Southern Paiute land withdrawals. Consultation with the BIA and the Utah Southern Paiutes to avoid this competition is suggested as a mitigation.

ALTERNATIVE 3 (4.3.2.13.2.5)

The DDA of the Proposed Action and that of Alternative 3 are identical and so are its possible effects on Native American agricultural land and water resources.

The Proposed Action base at Coyote Spring is the same as for Alternative 3. See that section for possible impacts.

The Alternative 3 operating base at Ely, Nevada, does not impact any identified Native American land or water resources.

ALTERNATIVE 4 (4.3.2.13.2.6)

Since the DDA of the Proposed Action and that of Alternative 4 are identical the possible effects on Native American agricultural land and water resources are also the same.

Effects on Beryl and Coyote Spring locations of the bases have been discussed under Alternative 1.

ALTERNATIVE 5 (4.3.2.13.2.7)

The DDA of the Proposed Action and that of Alternative 5 are identical in layout. Potential impacts on Native American water and land use are therefore the same.

Effects on Milford OB site are described under Alternative 1 and on Ely site under Alternative 3.

ALTERNATIVE 6 (4.3.2.13.2.8)

The Proposed Action DDA and that of Alternative 6 are identical. Potential impacts on Native American water resources and agricultural land uses are therefore identical with those of the proposed action DDA.

The Alternative 6 base at Milford, Utah, was discussed under Alternative 1.

The Alternative 6 base at Coyote Spring has been discussed under the Proposed Action.

ALTERNATIVE 7 (4.3.2.13.2.9)

There are no identified Native American water resources or agricultural land use in the Texas/New Mexico DDA or at either of the Alternative 7 OB bases at Clovis, New Mexico or Dalhart, Texas.

ALTERNATIVE 8 (4.3.2.13.2.10)

The Alternative 8 DDA splits M-X deployment between Nevada/Utah and Texas/New Mexico. There are no identified Native American water resources or agricultural land uses in the Texas/New Mexico half of the DDA. In the Nevada/Utah half of the DDA, potential impacts parallel those for the proposed action DDA but to a lesser degree. Possible short-term impacts on Duckwater Reservation water resources are limited to a small potential in Little Smoky South Valley (155C). Mitigative measures to avoid any impact would be identical to those suggested under the Proposed Action. (Figure 4.3.2.13-8).

Construction in the White River drainage is limited to Delamar Valley (182), Dry Lake Valley (181), Cave Valley (180), Coal Valley (171), Garden Valley (172), and White Pine Valley (207) under Alternative 8. (Table 4.3.2.13-9). The possibility for excessive water use impacting discharge at Muddy River Springs is reduced from the Proposed Action but a series of dry years could produce short-term impacts on Muddy River Springs and Moapa Reservation water resources similar to those described under the Proposed Action.

Mitigation measures suggested for the Proposed Action DDA to minimize this potential for impact apply under Alternative 8 as well.

The Alternative 8 base at Coyote Spring is identical with that under the Proposed Action. The high potential for impact at Coyote Spring on the discharge of the Muddy River Springs and present and future land use at the Moapa Reservation, as well as possible mitigation measures, are the same as under the Proposed Action. There are no identified Native American water resources or agricultural land use at the Alternative 8 base at Clovis, New Mexico.

NATIVE AMERICAN MIGRATIONS

INTRODUCTION (4.3.2.13.3.1)

Native Americans have lived in the Great Basin of Nevada and Utah for at least the last 10,000 years. During aboriginal times Native Americans migrated throughout the region to attend religious events and to take advantage of dispersed or seasonal resources such as fish and pine-nuts--a tradition of intraregional migration continuing to the present. This tradition has been further augmented in recent times by migration to take advantage of educational and job opportunities, to live with distant kin and to be near the venues of social and cultural events.

Significant changes in migration rates and patterns, with corresponding impacts on Native American resources and lifeways, would result from the development of new economic activity in the region. Native Americans experience chronic unemployment and underemployment. Kin relations, the tradition of mobility, and economic reality combine to cause migration toward new economic activity. Such migration could increase population of nearby Native American reservations and colonies.

PROPOSED ACTION (4.3.2.13.3.2)

There are a number of Native American reservations and colonies in and near the Proposed Action DDA and OB locations in Coyote Spring, Nevada and Milford, Utah (Figure 4.3.2.13-9) that could be involved in large scale migration in response to economic opportunities generated by M-X related activities.

Given the web of Native American kin relations throughout the Great Basin, their economically depressed condition, and their traditional pattern of migration, it is expected that Native American migrants in search of employment would gravitate toward reservations and colonies proximal to centers of economic activity.

There are no hard data with which to describe either baseline Native American economic migration in the Great Basin or with which to predict their response to economic opportunities. It is known that many have migrated to urban areas to take advantage of economic opportunities. Reservations and colonies have received a corresponding inflow of migrants back from the cities as economic development occurred.

Under the Proposed Action, reservations in and adjacent to the proposed DDA and OB locations are expected to receive migrants from more peripheral reservations and colonies. Given the generally depressed economic condition of Native Americans in the region, a migration to these new economic centers is anticipated. The primary receiving reservations would be the Duckwater Reservation (population 124) for construction in the center of the Nevada DDA, and the Moapa Reservation (population 189) for construction and operations under specific alternatives adjacent to the Coyote Spring OB. The Ely Colony (population 187) for construction or operation and the Goshute Reservation (population 602) for operations are more peripheral to the proposed DDA but could become destinations to job-seeking migrants. Similarly the Cedar City Colony (population about 177) and the Kanosh Reservation (population about 73) could become destinations for those seeking construction or operation jobs. Not only job seekers, but their dependents would base themselves near job opportunities. Given the relatively small populations of these reservations and colonies, a relatively small number of migrants could effect a large percentage change in reservation and colony population. The BLM has suggested a doubling or tripling of the population of receiving reservations and colonies.

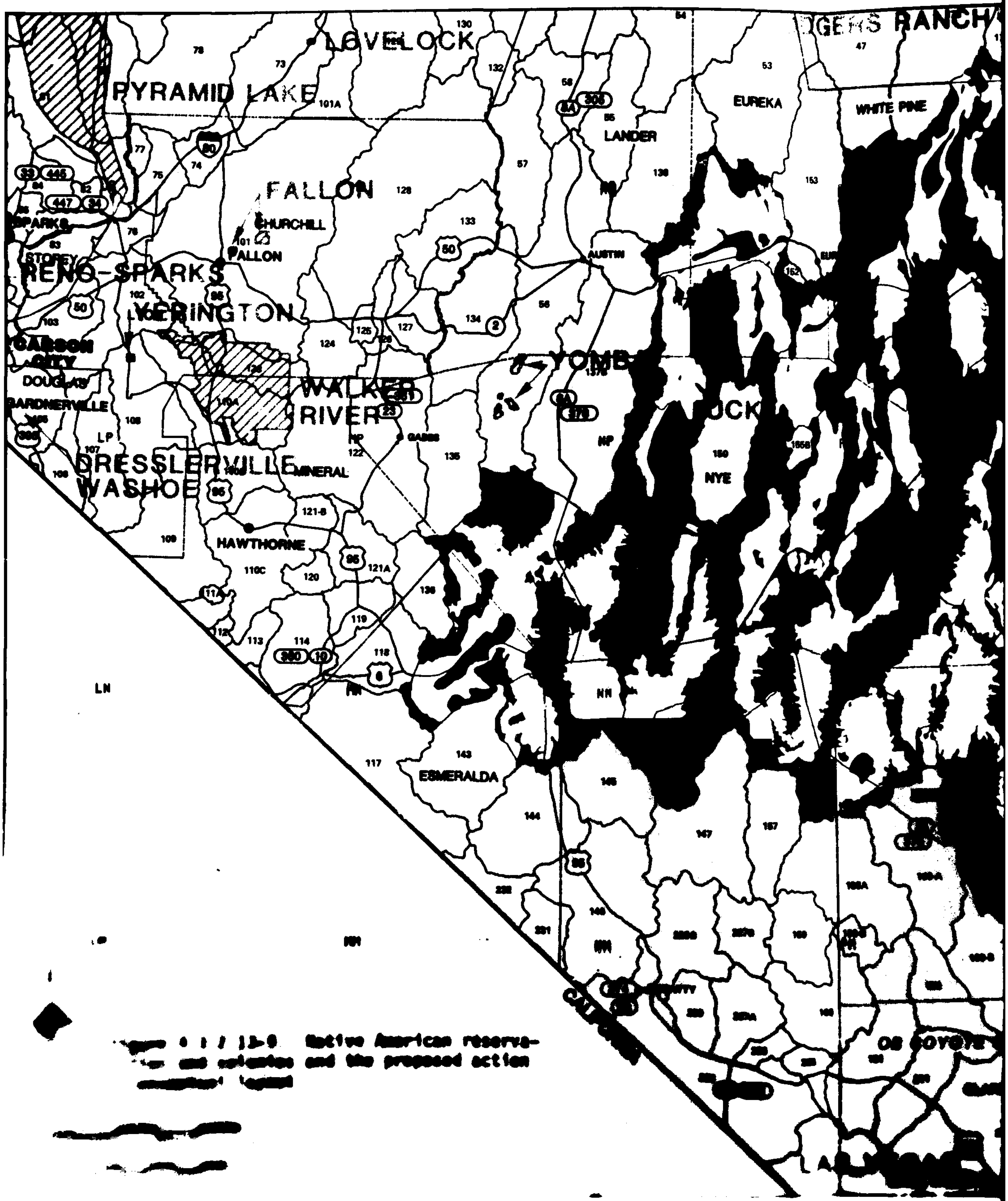
There are a number of short-term consequences occasioned by an increase in economic in-migration: 1) Community infrastructure (i.e., housing, water supplies, schools), recently improved at Duckwater and Moapa could become crowded. 2) Competition between in-migrants and residents for jobs in the area would occur. 3) Services would be reduced per capita. 4) Since reservations and colonies receive funding on the basis of enrolled residents, an influx of unenrolled residents would not be met by an increase in funding. These consequences would combine to stress social relations. Increased crowding on reservations would also produce an overflow into adjacent non-Indian communities with similar impacts on housing, employment and services.

There are a number of short-term consequences of economic out-migration. 1) A decrease in the labor force would result in a decline in total productivity. 2) Local development plans dependent on an existing labor supply would be postponed or abandoned. 3) Post-construction returnees would stress community infrastructure and economic resources which did not grow during their absence. 4) Increased population at reservations could lead to increased land and resource requirements to supply needs.

Potential mitigation of the consequences of migration are: temporary housing and service assistance to reservations and colonies receiving migrants, encouraging Native American employment on M-X generated activities during both construction operations, and providing monetary compensation for economic displacement and future economic disturbance.

ALTERNATIVE 1 (4.3.2.13.3.3)

Possible impacts and mitigative strategies for Alternative 1 do not differ in any significant way from those discussed in the Proposed Action except that the Shivwits Reservation (population 65) in Utah would become a potential base for Native American economic migrants and their dependents due to its relative proximity to an OB at Beryl. On the other hand the Kanosh Reservation would be less impacted due to its relative distance.



[illegible] Native American reserva-
[illegible] and colonies and the proposed action
[illegible]


106A
106
104
201
MT
BERYL

ALTERNATIVE 2 (4.3.2.13.3.4)

Possible impacts and mitigative strategies for Alternative 2 do not differ in any significant way from those discussed in the Proposed Action except that the Kanosh Reservation is closer to the proposed OB site at Delta, Utah and as such has a higher potential of receiving Native American economic migrants and their dependents.

ALTERNATIVE 3 (4.3.2.13.3.5)

Possible impacts and mitigative strategies for Alternative 3 do not differ in any significant way from those of the Proposed Action. Ely Colony, adjacent to the proposed OB site, would have a greater probability of receiving Native American economic migrants than it would under the Proposed Action. The Utah Southern Pauite reservations and colonies would be unlikely to be the destinations for economic migrants and instead would be expected to become suppliers of migrants to the receiving communities.

ALTERNATIVE 4 (4.3.2.13.3.6)

Possible impacts and suggested mitigations for Alternative 4 do not differ in any significant way from those of Alternative 2.

ALTERNATIVE 5 (4.3.2.13.3.7)

Possible impacts and suggested mitigations for Alternative 5 do not differ in any significant way from those of the Proposed Action. The Moapa Reservation would, however, be at little risk of receiving migrants and could, instead become a net supplier. The Ely Colony adjacent to the OB site would gain migrants as in Alternative 3 and would severely crowd existing housing and stress local services, however.

ALTERNATIVE 6 (4.3.2.13.3.8)

Possible impacts and suggested mitigations for Alternative 6 do not differ in any significant way from those suggested under the Proposed Action.

ALTERNATIVE 7 (4.3.2.13.3.9)

There are no Native American reservations and colonies in or around the immediate vicinity of the Texas/New Mexico DDA or proposed OB sites at Clovis, New Mexico and Dalhart, Texas.

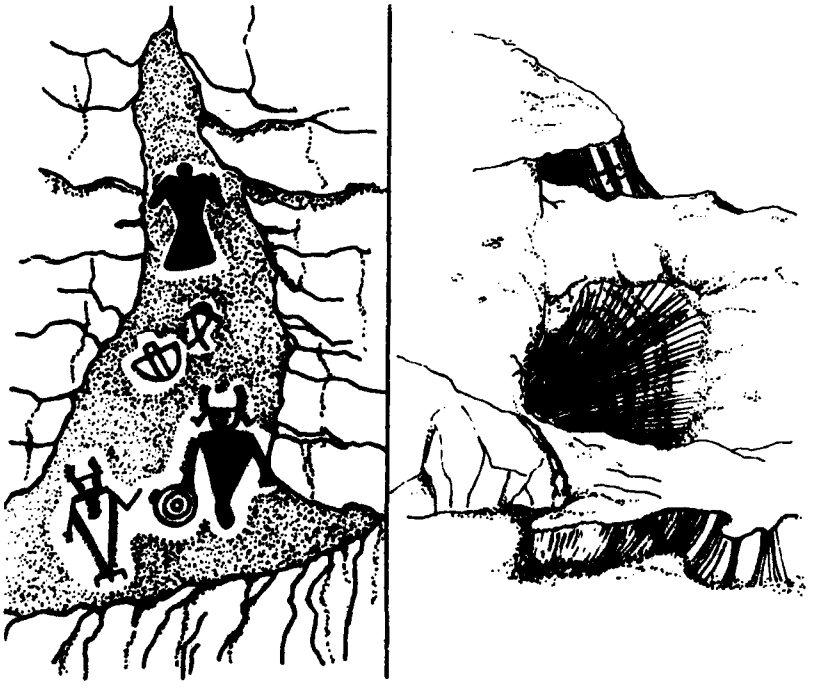
In-migration can be expected from New Mexico reservations and from among Native Americans in Oklahoma where high unemployment rates exist. The impact of this economic in-migration, however, would not differ from the impact of other non-Indian in-migrants (See sections on Population and Housing).

ALTERNATIVE 8 (4.3.2.13.3.10)

Possible impacts and suggested mitigations for Alternative 8 do not differ in any significant way from those under the Proposed Action or from Alternative 7.

There are no Native American reservations and colonies in the Texas/New Mexico study area. In the Nevada/Utah study area, fewer jobs and less activity surrounding the Duckwater Reservation would make it less an attraction for economic migrants. The Ely Colony, Goshute Reservation and the reservations and colonies of the Utah Southern Paiutes would also be less attractive due to their relative distance from centers of activity. Instead they could become net suppliers of migrants.

Archaelogical and Historical Resources



ARCHAEOLOGICAL AND HISTORICAL RESOURCES

INTRODUCTION (4.3.2.14.1)

Archaeological and historical resources are defined to include districts, sites, structures, objects, and other evidence of human use considered to be of significant value to a culture, a subculture, or a community for scientific, traditional, religious, and other reasons. Increased recognition of these properties as nonrenewable cultural resources has led to the enactment of federal legislation which mandates: (1) determination of the potential effects of an undertaking on cultural resources; and (2) preservation of sites in place or the preservation of data through data recovery efforts.

The concept of cultural resource significance is central to the legal process designed to ensure the preservation of cultural resources. Consequently, specific significance criteria for evaluating cultural resource eligibility for inclusion on the National Register of Historic Places have been defined in federal regulations (36 CFR 60.6). In practice, cultural resources are generally evaluated in terms of: 1) the research value of the property, and 2) the cultural value of the property to those groups associated with it. While it is expected that the majority of cultural resources encountered in the M-X study area will meet these criteria, each known resource in the study area has not been evaluated as to its eligibility to the National Register. Determinations of National Register eligibility and effect will be made after the completion of additional regional sample surveys and after proposed project layouts have been intensively surveyed during Tier Two studies. Significant direct and indirect effects are expected to occur to all categories of site types. Because archaeological and historical properties are considered nonrenewable resources, their destruction, whether through project construction, indirect impacts, or data recovery efforts, constitutes an irretrievable commitment of resources.

For the purpose of the present analysis, locational characteristics from existing site data have been used to develop predicted sensitivity levels that reflect distributional differences in site density and site diversity. Both existing site data and predicted sensitivity rankings were applied to the potential deployment valleys. Survey and recording biases in the existing data are recognized, and any predictions of areas of archaeological and historical sensitivity are preliminary. Levels

"moderate to very high" are the areas where the likelihood of encountering archaeological and historical resources is greatest and are therefore the least desirable areas for M-X siting. These areas are most available to mitigation by avoidance.

In order to assess the potential impacts to cultural resources from the proposed action, the amount of area for each sensitivity level was calculated for each valley from maps indicating both known and predicted areas of sensitivity. The proposed system was then overlaid, and direct impacts to each sensitivity level were estimated in terms of mi^2 of ground disturbance based on a set of assumptions for construction area requirements.

An index for assessing short-term and long-term potential indirect impacts in a valley was developed which considered population growth, proximity to an operating base or construction camp, increased accessibility from project roads, recreational appeal, and site sensitivity.

PROPOSED ACTION (4.3.2.14.2)

Figure 4.3.2.14-1 illustrates the relationship between the predicted archaeological and historical sensitivity zones and the conceptual project configuration for the DDA. Because archaeological and historical sites occur throughout the potential deployment area, direct project effects can be expected to occur in all sensitivity zones where there is overlap with the project. The greatest effects are anticipated, however, in valley areas designated as having "moderate to high" sensitivity potential. While greater numbers and a higher diversity of site types are expected to occur in the vicinity of present and extinct water sources, in the foothill zone, and in the pinyon-juniper association, it cannot be assumed that sites are uniformly distributed in these areas. Variability in the density, distribution, and types of sites is expected to occur within each zone with clusters of sites resulting due to the occurrence of exploitable resources and other critical environmental features. Furthermore, because of the large spatial extent of the M-X project and its large area of potential surface disturbance, it is possible that large numbers of particular types of cultural resources may be impacted. For example, sites consisting of surface scatters of chipped stone artifacts are very common in Great Basin valleys and large numbers of these sites may be directly impacted by this project. Similarly petroglyph sites, rock shelters, and ghost towns are site types that will be subjected to substantial indirect impacts.

DDA Impacts

Direct effects to archaeological and historical sites during construction and preconstruction testing could result from any land modification activities. Most of the roads, shelters, and other facilities will be constructed within the alluvial deposits of a valley; therefore, alluvial fans and valley bottoms where ground disturbance will be greatest are the areas where the potential for direct impacts to archaeological and historical resources will also be the greatest. Some roads, transmission lines, material sources, and other facilities will occur in mountain areas; thus, some direct effects are anticipated in mountain and foothill areas, though to a lesser degree than is expected in the alluvial portions of valleys. Potential impacts to archaeological and historical resources from DDA construction and operations are presented in Table 4.3.2.14-1.

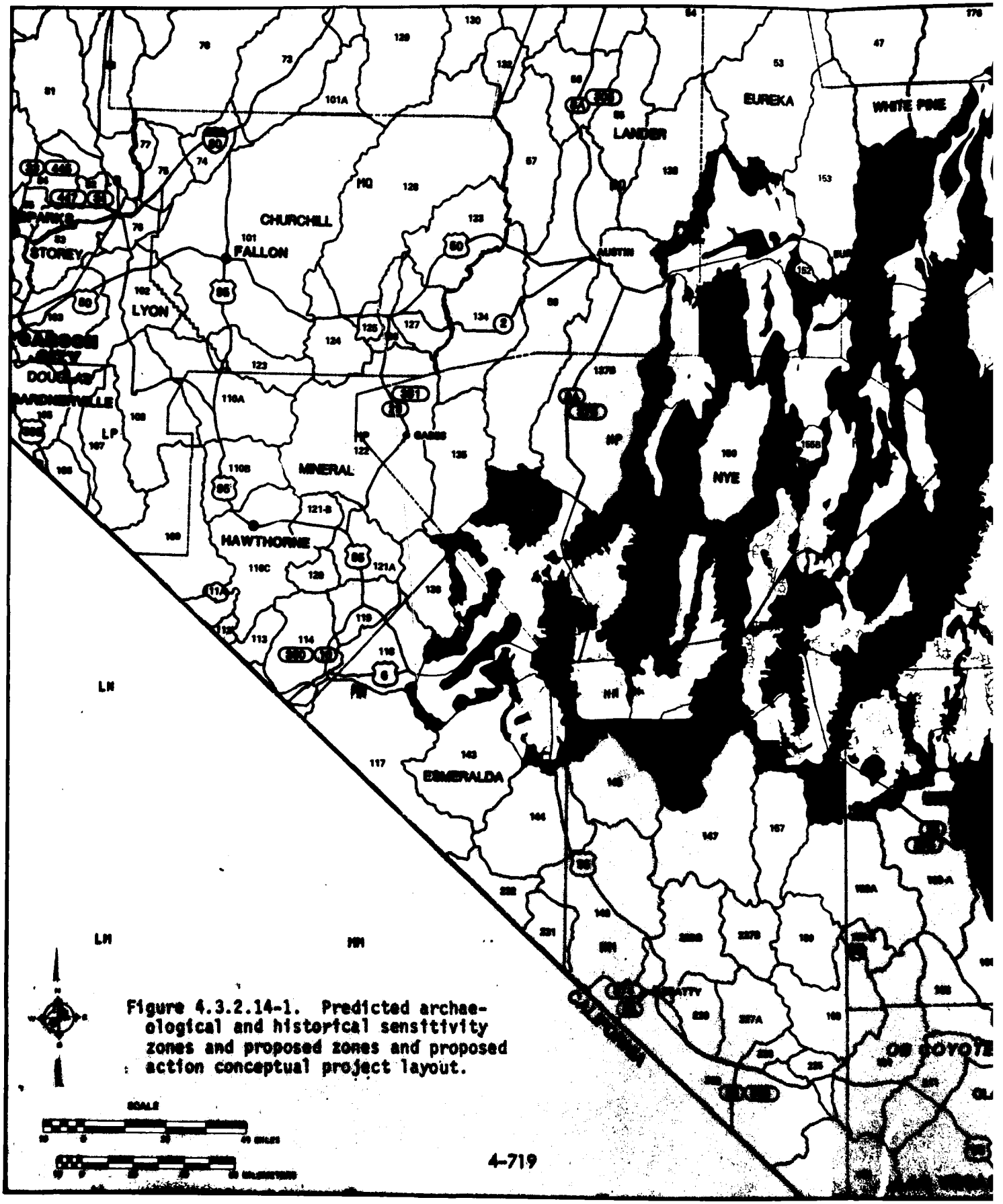
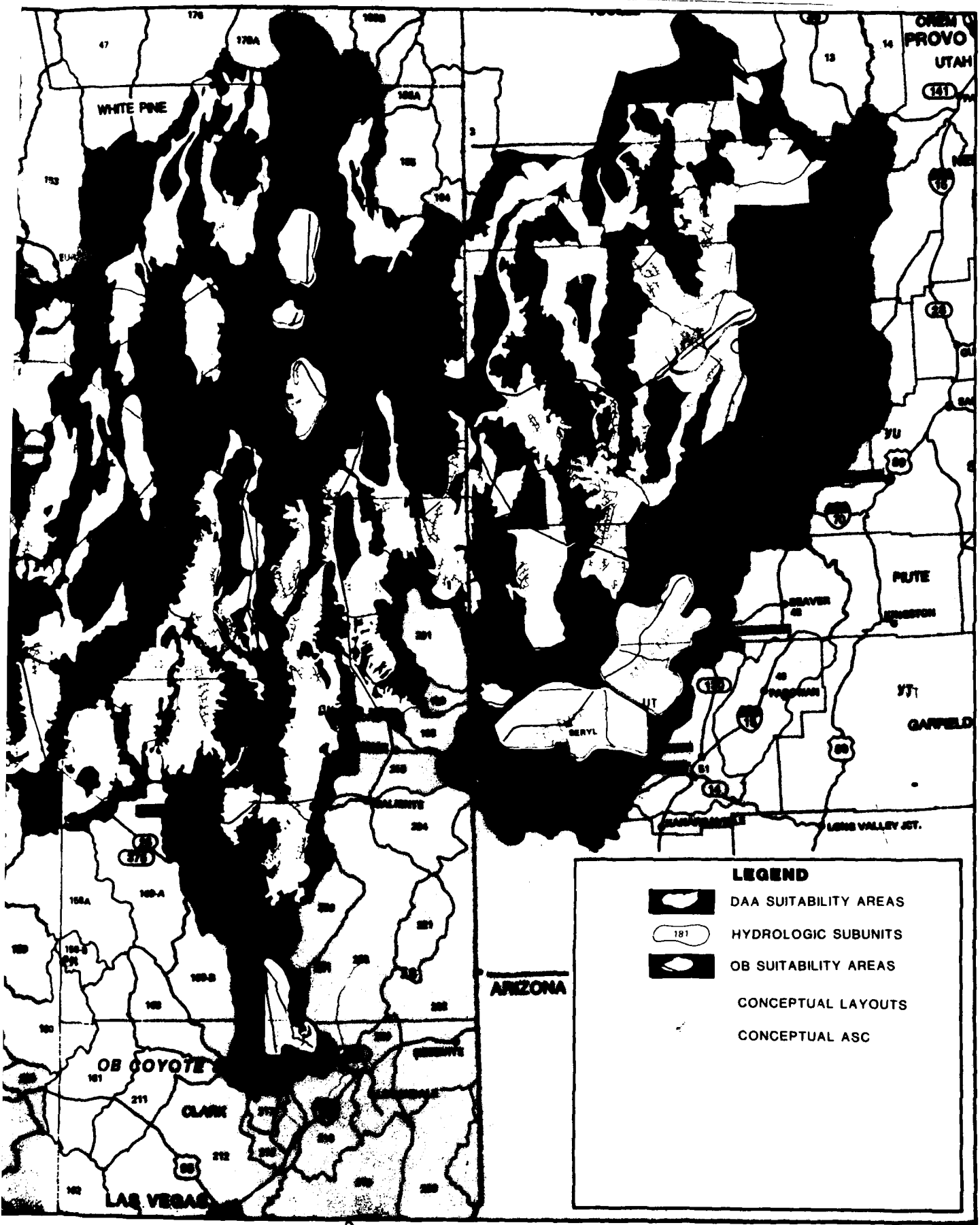


Figure 4.3.2.14-1. Predicted archaeological and historical sensitivity zones and proposed zones and proposed action conceptual project layout.


PROVO
UTAH
WHITE PINE
PIUTE
GARFIELD
BERYL
LONG VALLEY JCT.
ARIZONA
OB COYOTE
CLARK
LAS VEGAS
LEGEND
DAA SUITABILITY AREAS
181
HYDROLOGIC SUBUNITS
OB SUITABILITY AREAS
CONCEPTUAL LAYOUTS
CONCEPTUAL ASC

3222-D

Table 4.3.2.14-1. Potential impacts to archaeological and historical resources in Nevada/Utah DDA for the Proposed Action and for Alternatives 1-6.

HYDROLOGIC SUBUNIT		RELATIVE SENSITIVITY[1]	SHORT-TERM EFFECTS			LONG-TERM EFFECTS
			DISTURBANCE OF ARCHAEOLOGICAL AND HISTORICAL SENSITIVITY AREAS (SQ MI)		POTENTIAL IMPACT[1]	POTENTIAL IMPACT[1]
NO.	NAME		MODERATE TO HIGH	LOW		
	Subunits with M-X Clusters and DTN					
4	Snake		5.8	23.8		
5	Pine		0.8	9.0		
6	White		2.0	10.6		
7	Fish Springs		0.8	6.0		
8	Dugway		0.6	6.4		
9	Government Creek		1.2	1.2		
46	Sevier Desert		2.8	17.4		
46A	Sevier Desert & Dry Lake[2]		1.5	8.4		
54	Wah Wah		4.5	11.1		
137A	Big Smoky-Tonopah Flat		1.3	8.0		
139	Kobeh		4.1	11.2		
140	Monitor N & S		4.5	7.1		
141	Ralston		3.8	13.2		
142	Alkali Spring		1.8	8.1		
148/9	Cactus Flat & Stone Cabin[2]		3.1	9.5		
151	Antelope		3.3	7.2		
154	Newark[2]		1.8	4.7		
155A	Little Smoky N & S		7.3	7.5		
156	Hot Creek		4.8	10.0		
170	Penoyer		1.4	10.5		
171	Coal		3.1	6.8		
172	Garden		1.7	7.5		
173A	Railroad N & S		5.9	23.9		
174	Jakes[2]		2.9	4.6		
175	Long		2.0	3.4		
178B	Butte-South		1.8	7.0		
179	Steptoe		1.2	0.0		
180	Cave		0.9	5.0		
181	Dry Lake[2]		4.3	14.3		
182	Delamar		0.8	4.9		
183	Lake		2.3	7.0		
184	Spring		0.7	3.3		
196	Hamlin		4.3	8.2		
202	Patterson		0.4	1.5		
207	White River		3.3	10.7		
208	Pahroc		0.3	0.5		
209	Pahranagat		0.0	2.0		
	Overall DDA		93.1	301.5		

3901

[1]

No impact.

Low impact.

Moderate impact (moderately sensitive).

Moderately high to high impact (high sensitivity).

[2]Conceptual location of Area Support Centers (ASCs).

Construction within the DDA is likely to cause indirect effects on archaeological and historical resources primarily as a result of the recreational activities of construction workers. For example, ORV use is likely to be a common recreational pursuit of M-X construction workers and is a well-documented source of impacts to the fragile open archaeological sites common on alluvial surfaces within the valleys of Nevada/Utah. Furthermore, the potential for indirect impacts to historic resources is especially high, due largely to their high visibility. Other recreational activities within the DDA are likely to be concentrated in wooded or well-watered areas where the density of both archaeological and historical resources tends to be relatively high. Vandalism or unintentional damage to these properties are likely results of intensive recreational use of such areas. The valleys where such impacts are most likely to occur are those where construction camps are located.

Direct impacts to current National Register properties have been avoided by the cluster layout under consideration. The Sunshine locality and Paleo-Indian site 42MD300 appear to be directly impacted by the placement of roads and shelters in the conceptual layout. These and a number of other National Register properties are subject to high potential indirect impacts due to the proximity of the system layout and construction camps (Table 4.3.2.14-2). Tier Two studies will identify specific potential impacts and implement mitigations.

The location and rate of occurrence of both direct and indirect impacts within the DDA is determined principally by the M-X construction schedule. The implementation of other planned projects such as IPP or WPPP would increase the amount of direct impacts to the cultural resource base in affected valleys, but the amount of surface disturbance that will result from these projects is significantly smaller and highly localized relative to M-X-related surface disturbance. Cumulative effects of other projects are more likely to be significant when indirect impacts of the OB locations are considered.

Archaeological and historical resources are nonrenewable, therefore their preservation in place is generally the most desirable management alternative. With advanced planning, preservation in place can be achieved to a significant degree by developing project layouts that avoid known and predicted high sensitivity areas to the maximum extent feasible. Where avoidance is not feasible, comprehensive data recovery and analysis programs are required in accordance with the procedures outlined in the Programmatic Memorandum of Agreement (PMOA) developed between the Air Force and the Advisory Council on Historic Preservation and other concerned agencies. The PMOA is included as an Appendix in Chapter 5.

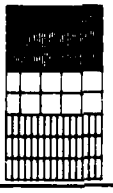
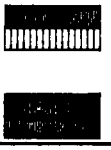
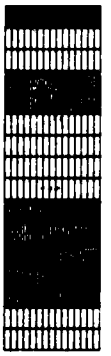
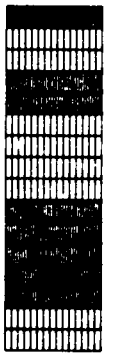
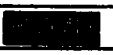
Operating Base (OB) Impacts

Figures 4.3.2.14-2 and 4.3.2.14-3 illustrate the relationship between the predicted archaeological and historical sensitivity zones and the OB suitability areas around Coyote Spring Valley, Nevada and Milford, Utah. Table 4.3.2.14-2 indicates those valleys subject to direct and indirect impacts resulting from the Proposed Action.

Coyote Spring Valley OB Impacts

Intensive field surveys have not been conducted in the proposed Coyote Spring OB siting area nor in the suitability zone surrounding the proposed OB. Existing

Table 4.3.2.14-2. Potential impact to archaeological and historical resources from operating bases (OBs) for the Proposed Action and Alternatives 1-8. (Page 1 of 9)

HYDROLOGIC SUBUNIT OR COUNTY		RELATIVE SENSITIVITY TO DISTURBANCE[1]	PROPOSED ACTION COYOTE SPRING/MILFORD	
NO.	NAME		SHORT-TERM IMPACT[1]	LONG-TERM IMPACT[1]
	Subunits or Counties within OB Suitability Area			
46	Sevier Desert			
46A	Sevier Desert-Dry Lake[2]			
50	Milford			
52	Lund District			
53	Beryl-Enterprise			
179	Steptoe			
210	Coyote Spring			
219	Muddy River Springs			
	Curry County, NM Hartley County, TX			
	Other Affected Subunits or Counties			
4	Snake			
5	Pine			
6	White			
46	Sevier Desert			
53	Beryl-Enterprise			
169	Tikaboo			
170	Penoyer			
180	Cave			
182	Delamar			
183	Lake			
196	Hamlin			
202	Patterson			
205	Meadow Valley			
206	Kane Springs			
208	Pahroc			
209	Pahranagat			
	Overall Impact for OB			

3902-2

[1]

No impact. Moderate impact.

Low impact. High impact.

[2]Conceptual location of Area Support Centers (ASCs).

Table 4.3.2.14-2. (continued) Potential impact to archaeological and historical resources from operating bases (OBs) for the Proposed Action and Alternatives 1-8. (Page 2 of 9)

HYDROLOGIC SUBUNIT OR COUNTY		RELATIVE SENSITIVITY TO DISTURBANCE[1]	ALTERNATIVE 1 COYOTE SPRING/BERYL	
NO.	NAME		SHORT-TERM IMPACT[1]	LONG-TERM IMPACT[1]
	Subunits or Counties within OB Suitability Area			
46	Sevier Desert			
46A	Sevier Desert-Dry Lake[2]			
50	Milford[2]			
52	Lund District			
53	Beryl-Enterprise			
179	Steptoe			
210	Coyote Spring			
219	Muddy River Springs			
	Curry County, NM Hartley County, TX[2]			
	Other Affected Subunits or Counties			
4	Snake			
5	Pine			
46	Sevier Desert[2]			
53	Beryl-Enterprise			
169	Tikaboo			
170	Penoyer			
172	Garden			
180	Cave			
182	Delamar			
183	Lake			
196	Hamlin			
202	Patterson			
205	Meadow Valley			
206	Kane Springs			
207	White River[2]			
208	Pahroc			
209	Pahranagat			
	Overall Impact for OB			

3902-2

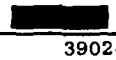
[1]

No impact. Moderate impact.

Low impact. High impact.

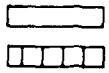
[2]Conceptual location of Area Support Centers (ASCs).

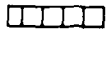
Table 4.3.2.14-2. (continued) Potential impact to archaeological and historical resources from operating bases (OBs) for the Proposed Action and Alternatives 1-8. (Page 3 of 9)

HYDROLOGIC SUBUNIT OR COUNTY		RELATIVE SENSITIVITY TO DISTURBANCE	ALTERNATIVE 2 COYOTE SPRING/DELTA	
NO.	NAME		SHORT-TERM IMPACT[1]	LONG-TERM IMPACT[1]
	Subunits or Counties within OB Suitability Area			
46	Sevier Desert			
46A	Sevier Desert-Dry Lake[2]			
50	Milford [2]			
52	Lund District			
53	Beryl-Enterprise			
179	Steptoe			
210	Coyote Spring			
219	Muddy River Springs			
	Curry County, NM			
	Hartley County, TX[2]			
	Other Affected Subunits or Counties			
4	Snake			
6	White			
7	Fish Springs			
9	Government Creek			
53	Beryl-Enterprise			
169	Tikaboo			
180	Cave			
182	Delamar			
183	Lake			
184	Spring			
196	Hamlin			
202	Patterson			
205	Meadow Valley			
206	Kane Springs			
208	Pahroc			
209	Pahranagat			
	Overall Impact for OB			

3902-2

[1]

 No impact.  Moderate impact.

 Low impact.  High impact.

[2]Conceptual location of Area Support Centers (ASCs).

AD-A104 360 AIR FORCE SYSTEMS COMMAND WASHINGTON DC F/G 5/3
DRAFT ENVIRONMENTAL IMPACT STATEMENT, MX DEPLOYMENT AREA SELECT--ETC(U)
DEC 80
UNCLASSIFIED AFSC-TR-81-60 NL

3 OF 4
AD A104360

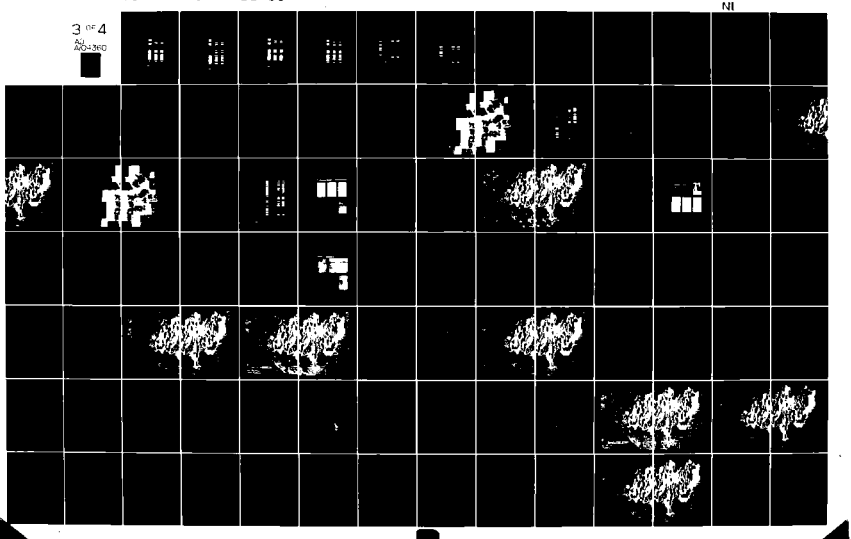


Table 4.3.2.14-2. (continued) Potential impact to archaeological and historical resources from operating bases (OBs) for the Proposed Action and Alternatives 1-8. (Page 4 of 9)

HYDROLOGIC SUBUNIT OR COUNTY		RELATIVE SENSITIVITY TO DISTURBANCE[1]	ALTERNATIVE 3 BERYL/ELY	
NO.	NAME		SHORT-TERM IMPACT[1]	LONG-TERM IMPACT[1]
	Subunits or Counties within OB Suitability Area			
46	Sevier Desert			
46A	Sevier Desert-Dry Lake[2]			
50	Milford[2]			
52	Lund District			
53	Beryl-Enterprise			
179	Steptoe			
210	Coyote Spring			
219	Muddy River Springs			
	Curry County, NM Hartley County, TX[2]			
	Other Affected Subunits or Counties			
4	Snake			
5	Pine			
6	White			
46	Sevier Desert			
156	Hot Creek			
172	Garden			
174	Jakes[2]			
180	Cave			
183	Lake			
184	Spring			
196	Hamlin			
202	Patterson			
205	Meadow Valley			
207	White River[2]			
	Overall Impact for OB			

3902-2

[1]

No impact. Moderate impact.

Low impact. High impact.

[2]Conceptual location of Area Support Centers (ASCs).

Table 4.3.2.14-2. (continued) Potential impact to archaeological and historical resources from operating bases (OBs) for the Proposed Action and Alternatives 1-8. (Page 5 of 9)

HYDROLOGIC SUBUNIT OR COUNTY		RELATIVE SENSITIVITY TO DISTURBANCE[1]	ALTERNATIVE 4 BERYL/COYOTE SPRING	
NO.	NAME		SHORT-TERM IMPACT[1]	LONG-TERM IMPACT[1]
	Subunits or Counties within OB Suitability Area			
46	Sevier Desert			
46A	Sevier Desert-Dry Lake[2]			
50	Milford[2]			
52	Lund District			
53	Beryl-Enterprise			
179	Steptoe			
210	Coyote Spring			
219	Muddy River Springs			
	Curry County, NM			
	Hartley County, TX[2]			
	Other Affected Subunits or Counties			
4	Snake			
5	Pine			
6	White			
46	Sevier Desert			
169	Tikaboo			
170	Penoyer			
172	Garden			
180	Cave			
182	Delamar			
183	Lake			
184	Spring			
196	Hamlin			
202	Patterson			
205	Meadow Valley			
206	Kane Springs			
207	White River[2]			
209	Pahranagat			
	Overall Impact for OB			

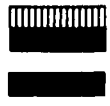
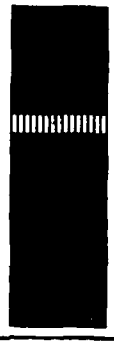
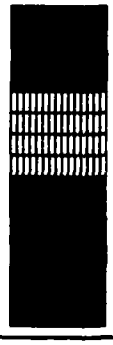
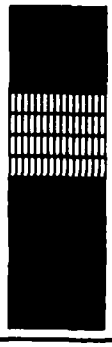
3902-2

No impact. Moderate impact.

Low impact. High impact.

[2]Conceptual location of Area Support Centers (ASCs).

Table 4.3.2.14-2. (continued) Potential impact to archaeological and historical resources from operating bases (OBs) for the Proposed Action and Alternatives 1-8. (Page 6 of 9)

HYDROLOGIC SUBUNIT OR COUNTY		RELATIVE SENSITIVITY TO DISTURBANCE[1]	ALTERNATIVE 5 MILFORD/ELY	
NO.	NAME		SHORT-TERM IMPACT[1]	LONG-TERM IMPACT[1]
	Subunits or Counties within OB Suitability Area			
46	Sevier Desert			
46A	Sevier Desert-Dry Lake[2]			
50	Milford[2]			
52	Lund District			
53	Beryl-Enterprise			
179	Steptoe			
210	Coyote Spring			
219	Muddy River Springs			
	Curry County, NM Hartley County, TX[2]			
	Other Affected Subunits or Counties			
4	Snake			
5	Pine			
6	White			
46	Sevier Desert			
46A	Sevier Desert-Dry Lake[2]			
54	Wah Wah			
156	Hot Creek			
172	Garden			
174	Jakes[2]			
180	Cave			
183	Lake			
184	Spring			
196	Hamlin			
202	Patterson			
207	White River[2]			
	Overall Impact for OB			

3902-2

[1] No impact. Moderate impact. Low impact. High impact.

[2] Conceptual location of Area Support Centers (ASCs).

Table 4.3.2.14-2. (continued) Potential impact to archaeological and historical resources from operating bases (OBs) for the Proposed Action and Alternatives 1-8. (Page 7 of 9)

HYDROLOGIC SUBUNIT OR COUNTY		RELATIVE SENSITIVITY TO DISTURBANCE[1]	ALTERNATIVE 6 MILFORD/COYOTE SPRING	
NO.	NAME		SHORT-TERM IMPACT[1]	LONG-TERM IMPACT[1]
	Subunits or Counties within OB Suitability Area			
46 46A 50 52 53 179 210 219	Sevier Desert Sevier Desert-Dry Lake[2] Milford[2] Lund District Beryl-Enterprise Steptoe Coyote Spring Muddy River Springs			
	Curry County, NM Hartley County, TX[2]			
	Other Affected Subunits or Counties			
4 5 6 46 53 54 180 183 184 196 202 205 206 207 209	Snake Pine White Sevier Desert Beryl-Enterprise Wah Wah Cave Lake Spring Hamlin Patterson Meadow Valley Kane Springs White River[2] Pahranagat			
	Overall Impact for OB			

3902-2

[1] No impact. Moderate impact. Low impact. High impact.

[2] Conceptual location of Area Support Centers (ASCs).

Table 4.3.2.14-2. (continued) Potential impact to archaeological and historical resources from operating bases (OBs) for the Proposed Action and Alternatives 1-8. (Page 8 of 9)

COUNTY	RELATIVE SENSITIVITY[1]	ALTERNATIVE 7 CLOVIS/DALHART		
		SHORT-TERM EFFECT		LONG-TERM EFFECT
		DISTURBANCE OF ARCHAEOLOGICAL AND HISTORICAL SENSITIVITY AREAS (SQ MI)	POTENTIAL IMPACT[1]	POTENTIAL IMPACT[1]
Counties with OB Suitability Areas				
Hartley, TX[2]		6.6		
Curry, NM		13.1		
Other Affected Counties				
Bailey, TX		—		
Castro, TX		—		
Dallam, TX		—		
Deaf Smith, TX[2]		—		
Lamb, TX		—		
Moore, TX		—		
Oldham, TX		—		
Parmer, TX		—		
Sherman, TX		—		
Chaves, NM		—		
DeBaca, NM		—		
Harding, NM		—		
Quay, NM		—		
Roosevelt, NM[2]		—		
Union, NM		—		
Cimarron, OK		—		
Overall Impacts for the OB				

3902-2

[1] No impact. Moderate impact. Low impact. High impact.

[2] Conceptual location of Area Support Centers (ASCs).

Table 4.3.2.14-2. (continued) Potential impact to archaeological and historical resources from operating bases (OBs) for the Proposed Action and Alternatives 1-8. (Page 9 of 9)

HYDROLOGIC SUBUNIT OR COUNTY		RELATIVE SENSITIVITY[1]	ALTERNATIVE 8 COYOTE SPRING/CLOVIS			
			SHORT-TERM EFFECTS			LONG-TERM EFFECTS
			DISTURBANCE OF ARCHAEOLOGICAL AND HISTORICAL SENSITIVITY AREAS (SQ MI)		POTENTIAL IMPACT[1]	POTENTIAL IMPACT[1]
NO.	NAME		MODERATE TO HIGH	LOW		
	Subunits and Counties with OB Suitability Areas					
210	Coyote Spring		9.0	3.0		
219	Muddy River Springs		1.0	—		
	Curry, NM		13.1			
	Other Affected Subunits and Counties					
205	Meadow Valley		—	—		
206	Kane Springs		—	—		
209	Pahranagat		—	—		
	Bailey, TX		—	—		
	Castro, TX		—	—		
	Deaf Smith, TX		—	—		
	Lamb, TX		—	—		
	Parmer, TX		—	—		
	Chaves, NM		—	—		
	DeBaca, NM		—	—		
	Quay, NM		—	—		
	Roosevelt, NM[2]		—	—		
	Overall Impacts for OB		—	—		

3902-2

[1] No impact. Moderate impact. Low impact. High impact.

[2] Conceptual location of Area Support Centers (ASCs).

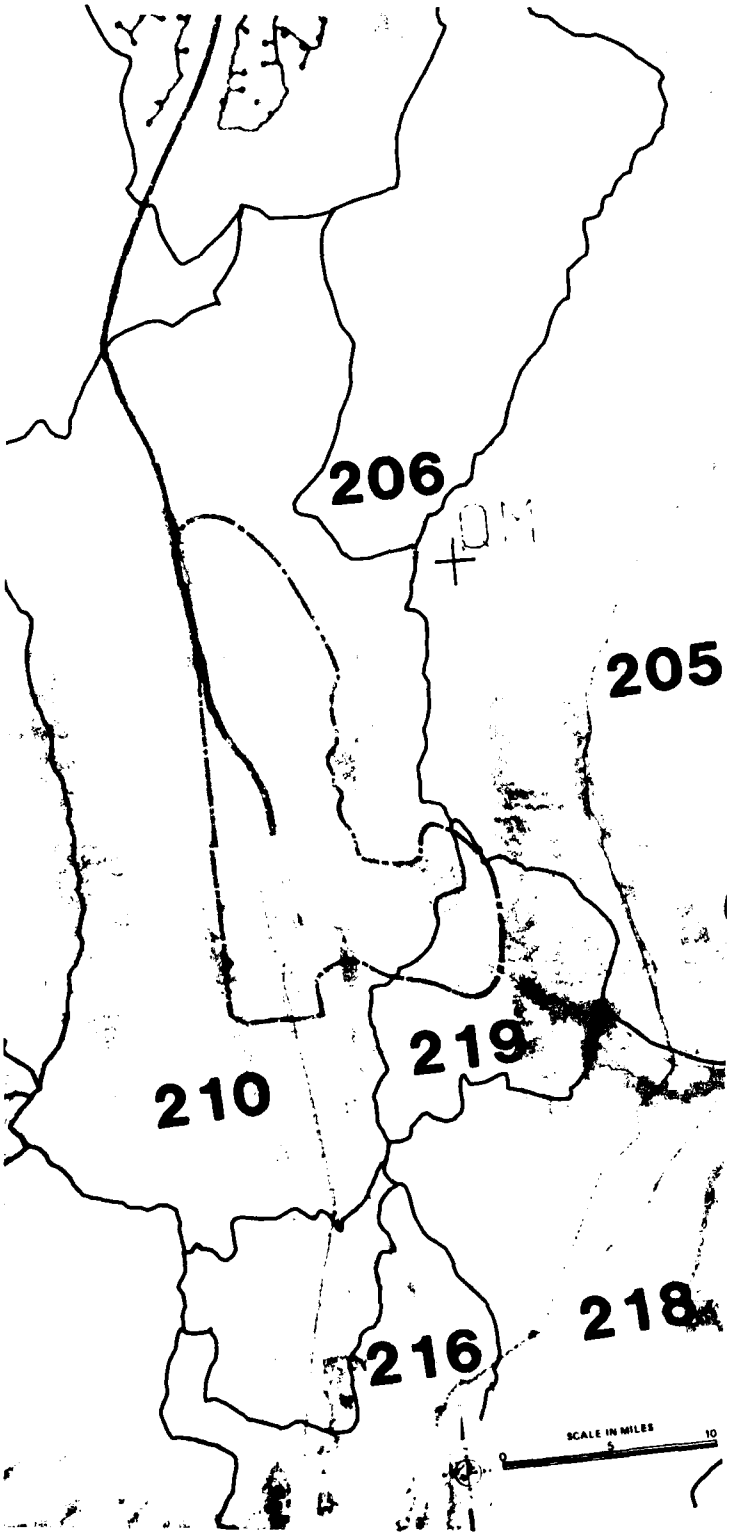


Figure 4.3.2.14-2. Areas of potential archaeological and historical sensitivity in the vicinity of Coyote Spring, Nevada.

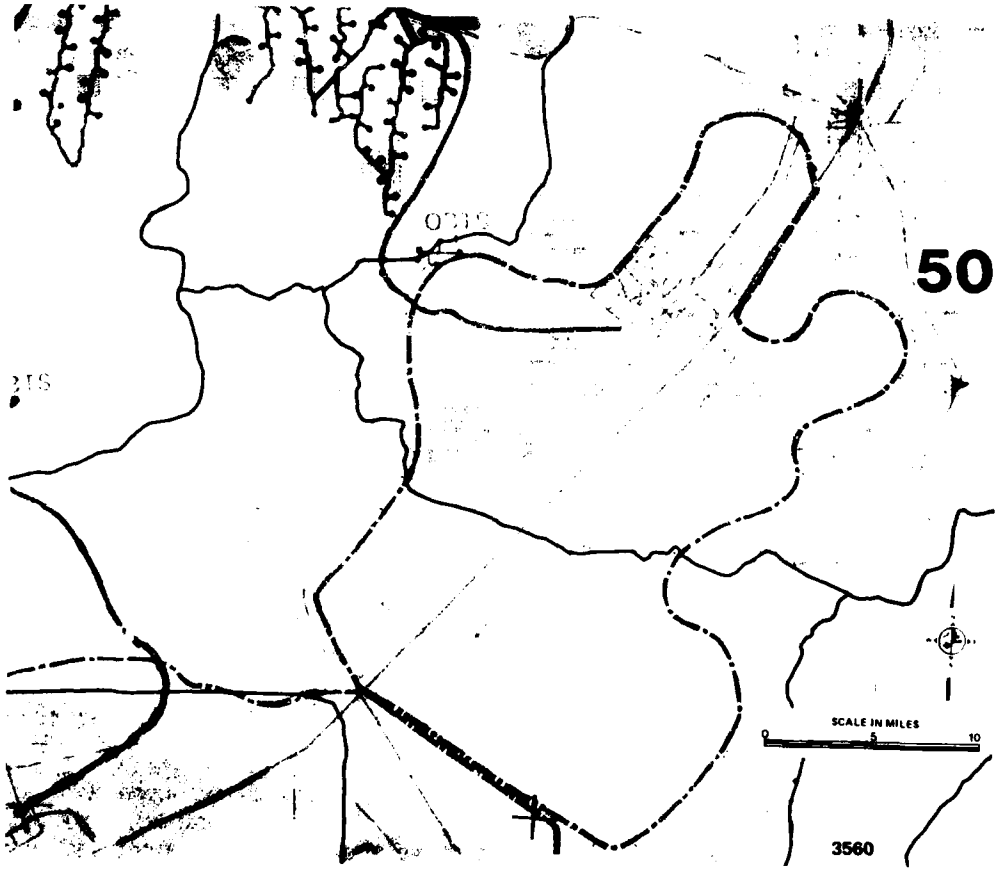


Figure 4.3.2.14-3. Areas of potential archaeological and historical sensitivity in the vicinity of Milford, Utah.

data suggest that sites tend to be located in proximity to water sources regardless of topographic setting, but more frequently in the foothills above the valley bottoms. Areas of extremely high sensitivity surround the proposed OB site.

As depicted, the residential and recreational areas of the OB will directly impact approximately 9mi^2 of potential moderate to high sensitivity area in the foothills north of the Muddy River, and approximately 3 mi ^{2} of moderate to low sensitivity area as a result of construction of the airfield, the DAA, the OB, the OBTS, and the roads connecting the OB to the residential area. No water sources such as springs presently occur within the proposed suitability zone; however, areas of potential high site density may occur in association with other critical resources which will be identified during Tier Two field surveys.

Possibilities for mitigating these potential direct impacts include movement of the residential area to the mid-bajada area on the west side of the Meadow Mountains and movement of the OBTS to the mid-bajada area north of Kane Springs Wash. Site density is expected to be somewhat lower here than in the foothills north of the Muddy River.

Previous studies (Lyneis and others, 1980) have shown that population increase, accessibility, and site visibility contribute significantly to increased indirect impacts. Adverse effects include vandalism, collection of artifacts, theft of materials, and increased off-road vehicle use and other recreational activities. Indirect impacts of this nature are anticipated to be much more extensive and more destructive to cultural resources than the direct effects of OB construction. These impacts will result from an induced population growth of nearly 28,000 in the region, with 15,000 people living on-base by 1989. Furthermore, there will be increased accessibility to once remote areas due to the project road network. National Register properties subject to indirect impacts include the Sheep Mountain Range, Black Canyon Petroglyphs, and the White River Narrows district. Other highly vulnerable areas include the Muddy River drainage, Arrow Canyon in the Moapa vicinity, the Meadow Valley drainage, and the Pahranagat and White River drainages. Numerous sites are known to occur in these areas surrounding the Coyote Spring OB.

Growth-related impacts in nearby communities potentially include neglect and decline of architecturally and historically significant properties, incongruous new construction disruptive of the community's architectural integrity, and demolition of significant structures for new construction. Effects of this nature are likely to occur in the urban Las Vegas area and in the smaller communities to the north including Caliente, Panaca, Alamo, Hiko, and Pioche.

While direct effects can usually be mitigated through resource avoidance, indirect impacts are more difficult to mitigate. Reduced population incursion, restricted access to sensitive areas, protective measures, and increased public education are measures which can serve to reduce these effects. In contrast to direct impacts which are of shorter duration and coincide with the construction effort, the indirect impacts are of long-term duration and will increase in proportion to the increase in population and the increase in accessibility. Both direct and indirect effects will result in the irretrievable commitment of non-renewable cultural resources.

Milford OB Impacts

Intensive field surveys will be conducted in the Milford suitability zone as part of Tier Two studies. The existing data base suggests that habitation sites are numerous along the entire Beaver River drainage and apparently occur with somewhat greater frequency to the north of Milford. Limited activity sites tend to occur most often on the gently sloping areas of the upper and lower bajada. These sites comprise nearly 80 percent of the known sites in the region.

As illustrated, the Milford OB will directly impact approximately 1 mi^2 of high sensitivity area in the vicinity of springs and about 1 mi^2 of the historic mining area of Shauntie near Topache Peak. The remaining residential and OB area situated in the foothills and on upper bajada will impact 6 mi^2 of moderate sensitivity area, and the airfield will impact an additional 2 mi^2 of probable low sensitivity area on the lower bajada. Until intensive surveys have been completed, it cannot be assumed that low site density will occur throughout the low sensitivity zone; however, it is likely that fewer impacts will occur to cultural resources if the residential areas can be moved to the south onto the lower bajada or to the east on the lower bajada. This move would be a direct trade-off with energy which, for efficiency and maximum use of passive energy techniques would be located on the upper Bajada and in the foothills.

Indirect impacts are likely to be far greater than direct impacts to cultural resources from OB construction. M-X-related population growth, coupled with increased accessibility will increase indirect impacts of vandalism and other recreational pursuits. National Register sites subject to potential indirect impacts include the Wildhorse Canyon Obsidian Quarry and Parowan Gap Petroglyphs. Other highly sensitive areas include the Beaver River drainage, Fremont sites in the Parowan Valley and other valleys to the south and east, and the National Forest areas to the east and south.

Growth-related impacts in nearby communities of Milford, Minersville, Beaver, and smaller communities will be substantial. Potential impacts include neglect and decline of architecturally and historically significant properties, non-conforming new construction, and demolition of significant structures.

ALTERNATIVE 1 (4.3.2.14.3)

DDA Impacts

The DDA system layout has basically the same impacts as the Proposed Action.

Operating Base (OB) Impacts

Figures 4.3.2.14-2 and 4.3.2.14-4 show the relationship between the predicted archaeological and historical sensitivity zones and the OB suitability areas around Coyote Spring Valley, Nevada and Beryl, Utah. Table 4.3.2.14-2 indicates those valleys subject to direct and indirect effects from construction of Alternative 1.

Coyote Spring Valley OB Impacts

The OB configuration is the same as that for the Proposed Action.

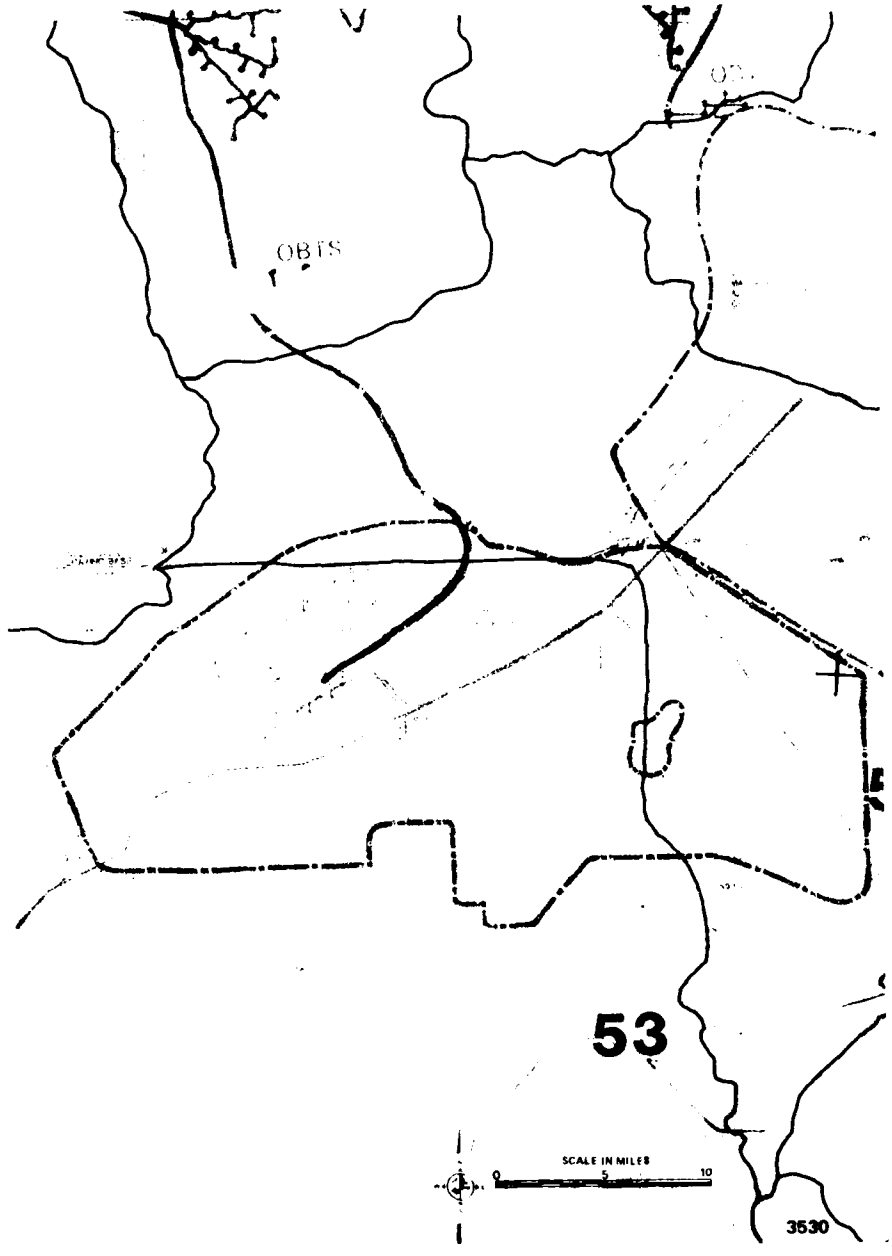


Figure 4.3.2.14-4. Areas of potential archaeological and historical sensitivity in the vicinity of Beryl, Utah.

Beryl OB Impacts

Direct impacts to archaeological and historical sites cannot be fully assessed at this time due to the lack of systematic survey in the proposed base location and in the suitability zone. These surveys will be performed as part of Tier Two environmental analysis. Recorded sites in the Beryl vicinity suggest that the locations of water sources are the most sensitive areas, and the upper bajada foothill zone tends to be the most sensitive topographic setting. Three limited activity sites are recorded in the vicinity of the OB airstrip. These include an historic dump, a possible campsite, and a sherd and lithic scatter. Other extremely sensitive areas include the Parowan Valley, the Dixie National Forest to the south and east, and the Virgin River drainage to the south.

The residential and recreational areas of the OB are currently designed to be built in the upper bajada foothill area of the Needle Range, thereby directly impacting about 5 mi^2 of moderate to high sensitivity area. Placed below the residential area on the lower bajada, the remaining OB facilities will impact about 4 mi^2 of low sensitivity area where site density is expected to be lower. No direct impacts are expected to occur to the three sites located in the airstrip vicinity. Moving the upper residential area down to the lower bajada area or to the valley floor near Beryl is likely to have the trade-offs comparable to those noted for Milford.

Population growth and increased accessibility provided by the M-X road network, will cause a substantial increase in indirect impacts. Growth related impacts to historical and architectural properties are likely to be greatest in Beryl, Modena, Cedar City, Enterprise, and possibly Parowan.

ALTERNATIVE 2 (4.3.2.14.4)

DDA Impacts

The DDA system layout is unchanged from the Proposed Action.

Operating Base (OB) Impacts

Figures 4.3.2.14-2 and 4.3.2.14-5 show the relationship between the predicted archaeological and historical sensitivity zones and the OB suitability areas around Coyote Spring, Nevada and Delta, Utah. Valleys subject to direct and indirect impacts from construction of Alternative 2 are presented in Table 4.3.2.14-2.

Coyote Spring Valley OB Impacts9

OB impacts are the same as those discussed for the Proposed Action.

Delta OB Impacts

Numerous archaeological and historical sites occur along the Sevier and Beaver river channels, and four National Register properties occur in the OB vicinity including Fort Deseret, the Gunnison Massacre site, the Topaz War Relocation Camp, and the Paleo Indian site, 42 MD 300.

As depicted, the various OB facilities appear to directly impact about 10 mi^2 of moderate to low sensitivity area. Siting of proposed OB facilities is preferable in

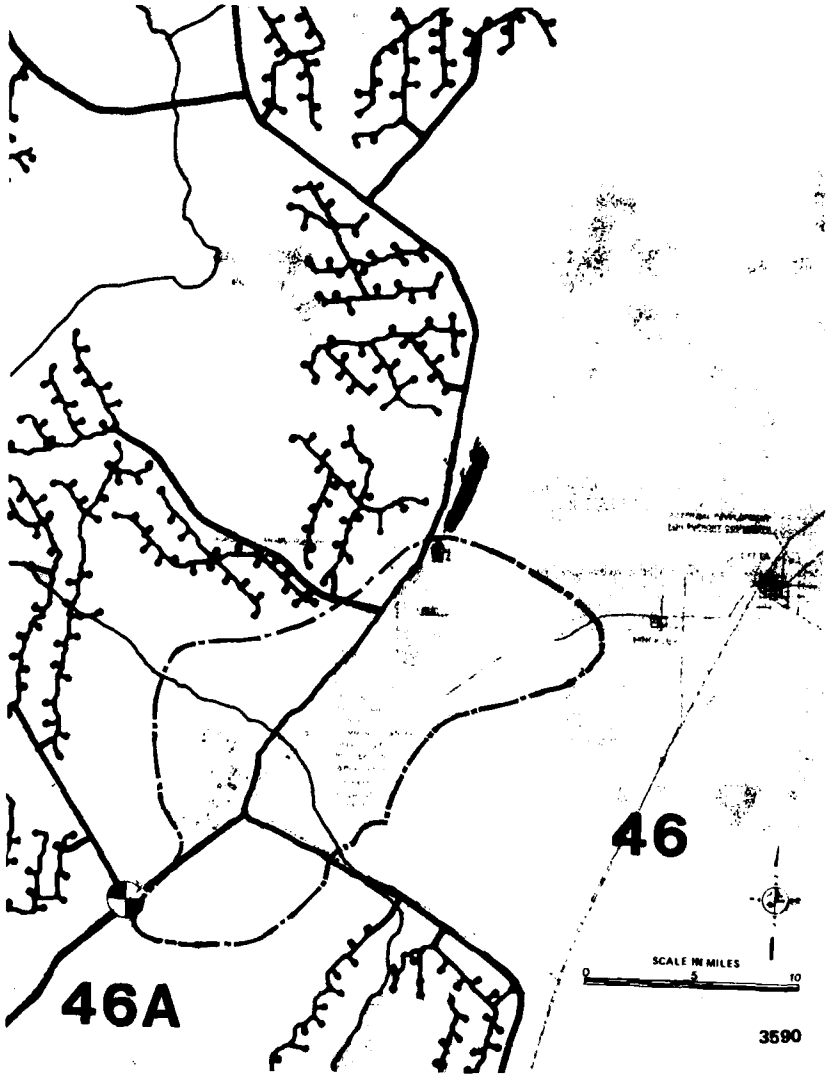


Figure 4.3.2.14-5. Areas of potential archaeological and historical sensitivity in the vicinity of Delta, Utah.

unwatered bajada areas placed as distantly as possible from the Sevier and Beaver rivers. It is not recommended at this time that the OB facilities be moved. However, the railroad spur addition appears to directly impact the National Register Paleo Indian site, 42 MD 300. It is highly probable that other significant cultural resources could be impacted by this railroad spur where it crosses near the confluence of the Beaver and Sevier rivers. To avoid these significant impacts, the railroad spur could follow the Hwy 6-50 right-of-way to the OB.

Substantial growth-related indirect impacts to cultural resources are anticipated due to an expected population growth. Impacts to historical and architecturally significant properties are likely to be greatest in Delta, Hinckley, Deseret, Oak City, and Lynndyl, those communities most proximal to the Delta OB.

ALTERNATIVE 3 (4.3.2.14.5)

DDA Impacts

DDA impacts are the same as those for the Proposed Action.

Operating Base (OB) Impacts

Figures 4.3.2.14-4 and 4.3.2.14-6 show the relationship between the predicted archaeological and historical sensitivity zones and the OB suitability areas around Beryl, Utah and Ely, Nevada. Valleys subject to direct and indirect effects from this alternative are presented in Table 4.3.2.14-2.

Beryl OB Impacts

Potential OB direct impacts are discussed in Alternative 1.

Construction of the OBTS in the foothills to the south of the Wah Wah mountains and the proposed alignment of the DTN to Pine Valley to the north are likely to cause impacts to a number of significant cultural resources. Three multiple activity habitation sites are recorded in the mountain pass to Pine Valley, and numerous sites are known in southern Pine Valley. The OBTS, to impact 250 acres, is situated in an area of potential high site density in the vicinity of numerous springs. Movement of the OBTS to the mid to lower bajada area would be likely to reduce direct impacts but would conflict with the protected Utah Prarie Dog reestablished area. Alternative DTN access route which avoids the pass to Pine Valley should be considered.

Indirect impacts from induced population growth and increased access are also expected to increase. As a first OB, the Beryl OB would have an on-base population of about 14,000 in 1989, and Iron County would grow by nearly 104 percent in 1986 due to an M-X induced population growth of 21,500.

Growth-related impacts to communities can also be expected to be somewhat greater than those discussed in Alternative 1.

Ely Nevada Area

Numerous sites have been recorded in Steptoe Valley and in the vicinity of the Ely alternative. Sensitive areas include mountain foothills, the upper bajada zone,

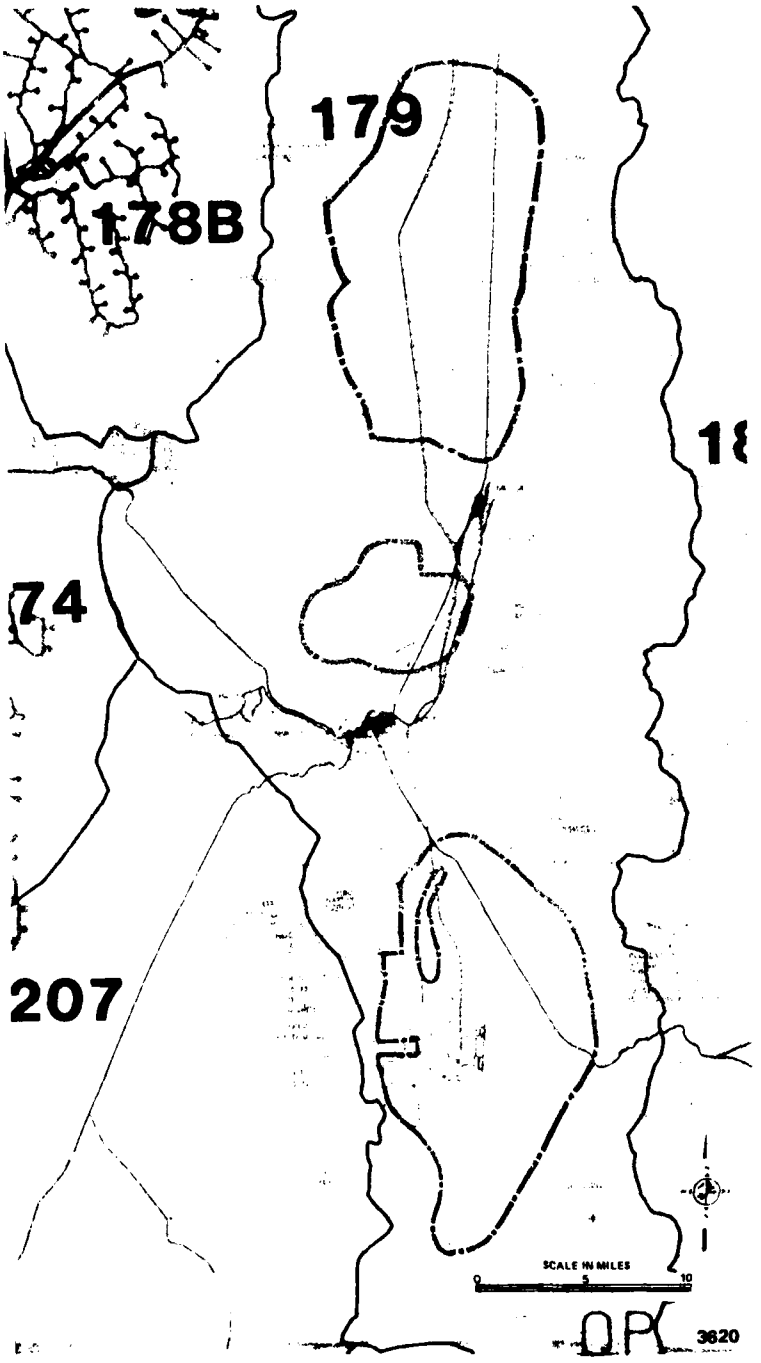


Figure 4.3.2.14-6. Areas of potential archaeological and historical sensitivity in the vicinity of Ely, Nevada.

and all water sources regardless of topographic setting. There are at least three known limited activity sites in the immediate vicinity of the OB in addition to the Ward mining district and the Ward Charcoal Ovens National Register site.

As depicted, the Ely OB does not directly impact any known sites; however, the Ward Ovens are located immediately to the north of the residential and recreational areas. While not directly impacted, the criteria of adverse effect (36 CFR 800.3b) include "isolation from or alteration of the property's surrounding environment" and "introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting". Furthermore, placement of the residential area on the upper bajada of the Egan Range in the vicinity of numerous springs has the potential to have a significant impact on cultural resources. Any movement of facilities should consider placement on unwatered mid to lower bajada areas. The three suitablility zones are considered highly sensitive to impacts to cultural resources. Indirect impact are anticipated to result from induced population growth.

Growth-related impacts to historical and architectural properties in nearby communities are likely to be greatest in Ely, McGill, and Ruth where this populaiton growth is likely to be centered.

ALTERNATIVE 4 (4.3.2.14.6)

DDA Impacts

The DDA impacts are the same as for the Proposed Action.

Operating Base (OB) Impacts

Figures 4.3.2.14-4 and 4.3.2.14-2 illustrate areas of potential impact at the Beryl OB and at the Coyote Spring OB. Valleys subject to direct and indirect impacts are indicated in Table 4.3.2.14-2.

Beryl OB Impacts

Potential OB impacts are the same as those discussed in Alternative 3.

Coyote Spring Valley OB Impacts

The impacts that would result from Coyote Spring as a primary OB are discussed in the Proposed Action. Coyote Spring as a second OB should result in a slight reduction in the levels of direct and indirect impacts that were identified in that section. Total surface disturbance will be reduced by about one-third from the area disturbed by a primary OB, with approximately 6 mi^2 of moderate sensitivity zone impacted and 2 $mi.^2$ of impacts to low sensitivity zone.

Population increases will be lower with Coyote Spring as a secondary base, therefore indirect impact potential should be somewhat lower than that discussed in the Proposed Action.

ALTERNATIVE 5 (4.3.2.14.7)

DDA Impacts

The DDA impacts are the same as for the Proposed Action.

Operating Base (OB) Impacts

Figures 4.3.2.14-3 and 4.3.2.14-6 illustrate areas of potential impact at the Milford, Utah OB and the Ely, Nevada OB. Table 4.3.2.14-2 presents those valleys subject to direct and indirect effects from this Alternative.

Milford OB Impacts

The impacts of a first OB at Milford will be similar, but generally greater, to construction of a secondary OB at Milford as discussed in the Proposed Action. Approximately 9m^2 of moderate sensitivity zone will be directly impacted by the primary OB, which is 3 mi^2 greater than the secondary OB already considered. Other direct impact estimates are the same as for the secondary OB.

Indirect impacts cannot be predicted with precision, but because of a greater population increase they are expected to be greater for the primary OB. Within Beaver County the population increase in a currently sparsely populated area is expected to be major source of indirect impacts to cultural resources.

It is possible that moving the OB support facilities to a mid or lower bajada setting would result in lower levels of impacts to archaeological and historical resources.

Ely OB Impacts

Impacts resulting from the Ely OB are the same as those discussed in Alternative 3.

ALTERNATIVE 6 (4.3.2.14.8)

The DDA impacts are the same as for the Proposed Action. Impacts for the first OB at Milford are discussed in Alternative 5 and impacts for the second OB at Coyote Spring are discussed in Alternative 4. Table 4.3.2.14-2 presents those valleys subject to direct and indirect effects from OB Alternative 6.

ALTERNATIVE 7 (4.3.2.14.9)

Current knowledge about archaeological and historical resources in the Texas/New Mexico study area is limited. Figure 4.3.2.14-7 shows the relationship between known and predicted areas of high archaeological and historical sensitivity and the conceptual project configuration. Both direct and indirect effects on archaeological and historical resources are expected to result from project implementation. Direct effects will result primarily from land disturbance activities during the construction phase, while indirect effects will be caused principally by large-scale population increase. Indirect effects will occur during both the

construction and operations phases. No other projects currently planned are expected to result in levels of surface disturbance or population growth that would necessitate consideration of their additive effects in relation to the M-X project.

DDA Impacts

Archaeological and historical resources frequently occur on, or buried slightly below, the present ground surface. They are thus subject to destruction by agriculture or other land modification including construction of M-X facilities and transportation corridors. Intensive agricultural activities throughout the Texas/New Mexico region have disturbed surface on real surface sites. Potential M-X impacts are most likely to occur when project elements are located along undisturbed draws on the Llano Estacado, along the margins of lakes or playas, or along river and stream edges in the Pecos and Canadian river valleys and the Panhandle High Plains. In some of these settings, especially within draws in the Llano Estacado, deeply stratified archaeological deposits are known to occur and may be subject to direct impacts.

Direct impacts to current National Register properties are avoided by the conceptual layout. However, indirect impacts to three archaeological sites on the Register, Landergin Mesa, Rocky Dell and Anderson Basin (Blackwater Draw), may occur. Many of the known archaeological, historical, and architectural resources clearly have the potential for being eligible for the National Register, and additional field and archival investigations would lend to the identification of many more such properties. Therefore as a preliminary method of assessing potential impacts to resources that are eligible to the National Register, project disturbance to areas of known and predicted cultural resources sensitivity has been measured. These figures are presented in Table 4.3.2.14-3, which also summarizes the impact level expected for each county. Impacts to archaeological and historical resources, are best mitigated by avoidance.

Operating Base (OB) Impacts

Figures 4.3.2.14-8 and 4.3.2.14-9 show the relationship between known and predicted areas of archaeological and historical sensitivity and the OB suitability areas around Clovis, New Mexico and Dalhart, Texas.

Clovis OB Impacts

The proposed Clovis OB would impact ten playa lakes, which have a predicted moderate sensitivity for archaeological and historical resources. These playas are scattered around the periphery of the proposed expansion area, and the designated suitability zone is too small to permit avoidance through redesign. A possible ancient tributary of Blackwater Draw, a high sensitivity area, immediately abuts the proposed OB.

The long-term increase in population that will result from siting an OB near Clovis will be a source of indirect impacts to cultural resources in the region. Impacts to significant architectural resources are unlikely to occur at Cannon Air Force Base; however, population increase in Clovis may cause impacts to resources there. One National Register site, Blackwater Draw/Anderson Basin, is located approximately 5 mi south of the proposed Clovis OB. This site is a privately owned

NATIONAL REGISTER OF HISTORIC PLACES

OKLAHOMA

CIMARRON COUNTY

1 BLACK MESA
2 CEDAR BREAKS ARCHAEOLOGICAL DISTRICT
3 BAT CAVE ARCHAEOLOGICAL SITE
4 RED GHOST CAVE ARCHAEOLOGICAL DISTRICT
5 THREE ENTRANCE CAVE ARCHAEOLOGICAL DISTRICT
6 CAMP NICHOLS

TEXAS COUNTY

7 SHORES ARCHAEOLOGICAL SITE
8 EASTERWOOD ARCHAEOLOGICAL SITE
9 NASH II-CLAWSON ARCHAEOLOGICAL SITE
10 TWO SISTERS ARCHAEOLOGICAL SITE
11 OLD HARDESTY
12 STAMPER SITE
13 JOHNSON-CIRNE ARCHAEOLOGICAL SITE

NEW MEXICO

CHAVES COUNTY

1 HONDO RESERVOIR
2 ARCHAEOLOGICAL SITE AR 30-6-1047
3 MESCALERO SANDS
4 BITTER LAKE GROUP
5 JAMES PHELPS WHITE HOUSE

DE BACA COUNTY

6 FORT SUMNER RAILROAD BRIDGE
7 FORT SUMNER RUINS

EDDY COUNTY

8 ARCHAEOLOGICAL SITE 30-6-1034
9 MAROON CLIFFS ARCHAEOLOGICAL DISTRICT
10 FIRST NATIONAL BANK OF EDDY
11 CARLSBAD RECLAMATION PROJECT

HARDING COUNTY

12 BUEYEROS SHORT GRASS PLAINS

LEA COUNTY

13 BAISH OIL WELL NUMBER ONE
14 ARCHAEOLOGICAL SITE AR-30-630 AND AR 7-73

QUAY COUNTY

15 RICHARDSON STORE

ROOSEVELT COUNTY

16 ANDERSON BASIN (BLACKWATER DRAW)

SAN MIGUEL COUNTY

17 BELL RANCH HEADQUARTERS

UNION COUNTY

18 RABBIT EARS (CLAYTON COMPLEX)

TEXAS

ARMSTRONG COUNTY

1 J A RANCH

BRISCOE COUNTY

2 LAKE THEO FOLSOM COMPLEX
3 MAYFIELD DUGOUT

BAILEY COUNTY

4 MULESHOE NATIONAL WILDLIFE REFUGE

CARSON COUNTY

5 CARSON COUNTY SQUARE HOUSE MUSEUM

DEAF SMITH CO. COUNTY

6 E. B. BLACK HOUSE

FLOYD COUNTY

7 QUITAQUE RAILWAY TUNNEL
8 FLOYDADA COUNTRY CLUB SITE

TEXAS CON'T

GARZA COUNTY

9 OLD ALGERITA HOTEL
10 OLD POST SANITARIUM
11 COOPER'S CANYON SITE
12 O. S. RANCH PETROGLYPHS
13 POST-MONTGOMERY SITE
14 POST WEST DUGOUT

HALE COUNTY

15 PLAINVIEW SITE

HUTCHINSON COUNTY

16 ANTELOPE CREEK ARCHAEOLOGICAL DISTRICT
17 ABODE WALLS

LUBBOCK COUNTY

18 CANYON LAKES ARCHAEOLOGICAL DISTRICT
19 LUBBOCK LAKE SITE

OLDHAM COUNTY

20 ROCKY DELL
21 LANDERGIN MESA

POTTER COUNTY

22 BIVENS HOUSE
23 LANDERGIN-HARRINGTON HOUSE
24 MCBRIDE RANCHHOUSE
25 ALABATES FLINT QUARRIES AND TEXAS PANHANDLE PUEBLO CULTURE NATIONAL MONUMENT

RANDALL COUNTY

26 L. T. LESTER HOUSE
27 HIGH PLAINS NATURAL AREA

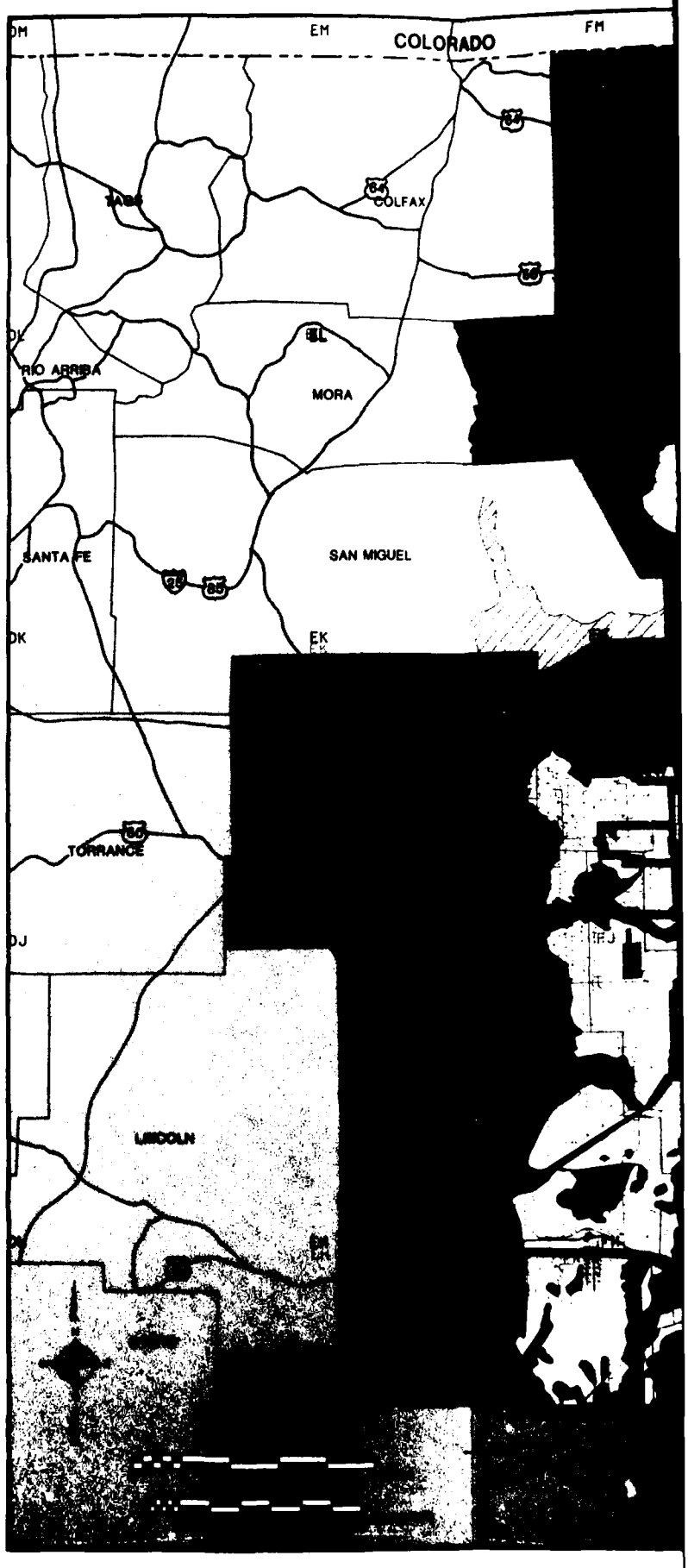
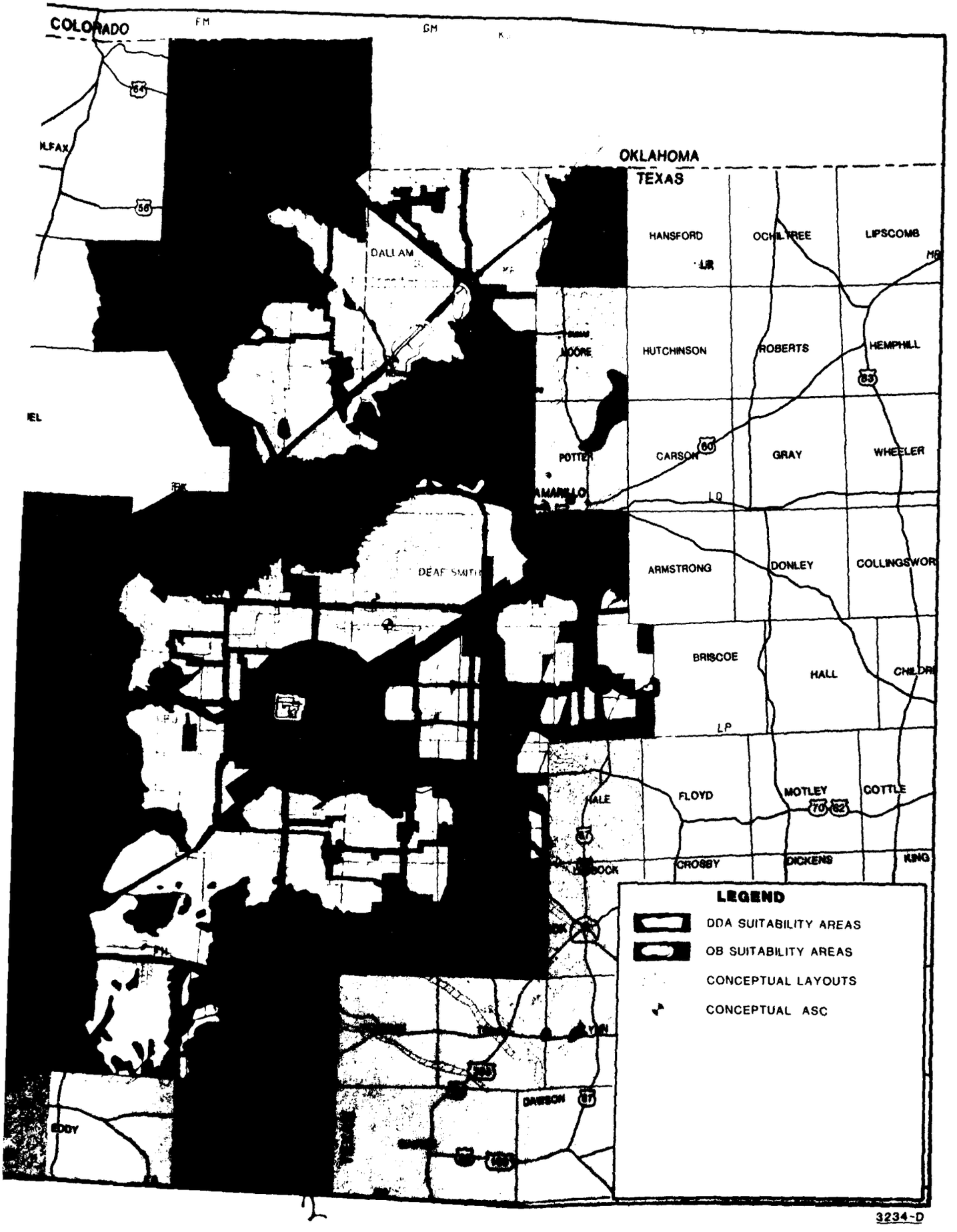
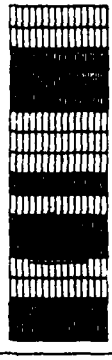
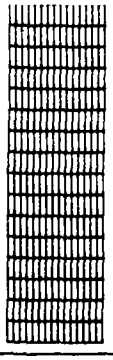
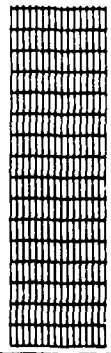


Figure 4.3.2.14-7. Relationship between areas of high archaeological and historical sensitivity--alternative 7.


COLORADO
OKLAHOMA
TEXAS
HANSFORD
OCHILTREE
LIPSCOMB
HUTCHINSON
ROBERTS
HEMPHILL
MOORE
POTTER
CARSON
GRAY
WHEELER
AMARILLO
ARMSTRONG
DONLEY
COLLINGSWOR
BRISCOE
HALL
FLOYD
MOTLEY
COTTLE
HALE
CROSBY
DICKENS
KING
DAWSON
EDDY
LEGEND
DDA SUITABILITY AREAS
OB SUITABILITY AREAS
CONCEPTUAL LAYOUTS
CONCEPTUAL ASC

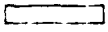
3234-D

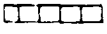
Table 4.3.2.14-3. Potential impact to cultural resources in Texas/New Mexico DDA for Alternative 7.

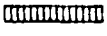
COUNTY	RELATIVE SENSITIVITY	SHORT-TERM EFFECT		LONG-TERM EFFECT
		DISTURBANCE OF ARCHAEOLOGICAL AND HISTORICAL SENSITIVITY AREAS (SQ MI)	POTENTIAL IMPACT	POTENTIAL IMPACT
Counties with M-X Clusters				
Bailey, TX		9.37		
Castro, TX		11.45		
Cochran, TX		5.03		
Dallam, TX		47.35		
Deaf Smith, TX[2]		44.23		
Hartley, TX[2]		27.92		
Hockley, TX		1.21		
Lamb, TX		3.30		
Oldham, TX		4.51		
Parmer, TX		12.66		
Randall, TX		4.16		
Sherman, TX		4.16		
Swisher, TX		2.43		
Chaves, NM		38.16		
Curry, NM		4.10		
DeBaca, NM		7.28		
Harding, NM		15.78		
Lea, NM		1.21		
Quay, NM		33.99		
Roosevelt, NM[2]		43.71		
Union, NM		16.65		
Other Affected Counties				
Cimarron, OK				
Texas, OK				
Armstrong, TX				
Briscoe				
Carson				
Floyd				
Hale				
Hansford				
Hutchinson				
Lubbock				
Moore				
Potter				
Terry				
Yoakum				
Guadalupe, NM				
San Miguel, NM				
Overall DDA				

3903-3

[1]

 No impact.

 Low impact.

 Moderate impact.

 Moderately high to high impact.

[2]Conceptual location of Area Support Centers (ASCs).

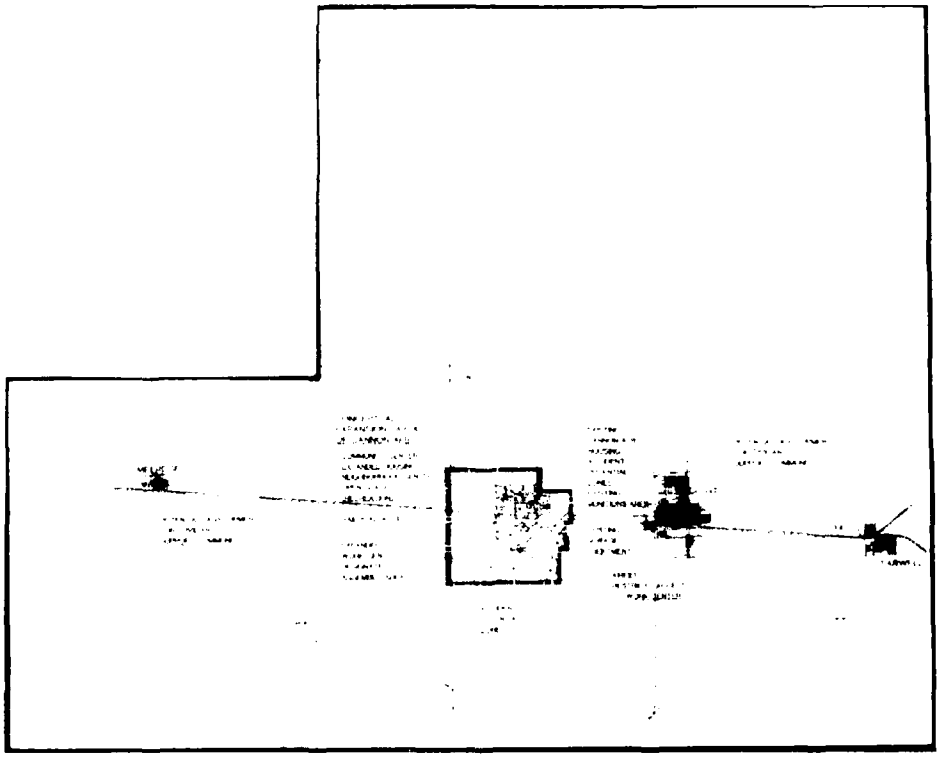


Figure 4.3.2.14-8. Areas of potential archaeological and historical sensitivity in the vicinity of Clovis, New Mexico.

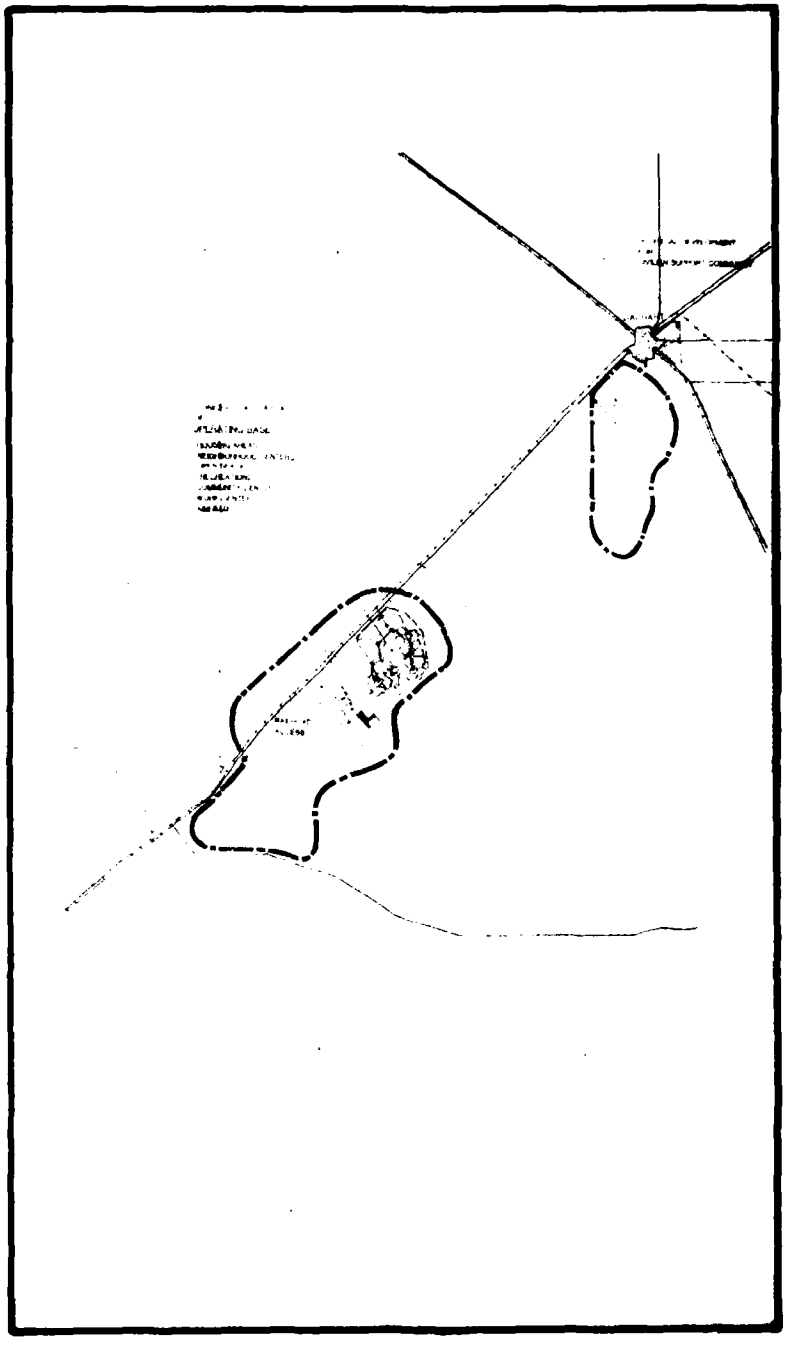


Figure 4.3.2.14-9. Areas of potential archaeological and historical sensitivity in the vicinity of Dalhart, Texas.

known source of gravel and may be impacted by further quarrying for OB construction. Predicted direct and indirect impacts of an OB near Clovis are summarized in Table 4.3.2.14-2.

Mitigation of potential impacts to resources in the construction area could be accomplished by avoidance and preservation. However, very little room for redesign has been allocated for the Clovis OB. If Tier Two studies determine the existence of significant resources in the predicted sensitive areas and these resources could not be avoided, a comprehensive program of data collection and analysis would be required. Potential impacts to the Blackwater Draw site would be difficult to mitigate as the site is in private hands. Impacts to architectural resources in Clovis may be mitigated by community preservation of significant structures.

Dalhart OB Impacts

In the northern preferred construction area there are two large playas which would be impacted by OB construction. Playas have a moderate sensitivity for archaeological and historical resources. The southern preferred construction area infringes upon the Punta de Agua Creek, an area with predicted high and moderate sensitivity.

The southern portion of the suitability zone impacts the headwater of Romero Spring Creek and a playa, high and moderate sensitivity areas, respectively. The area on the west side of Highway 54 is apparently free of predicted areas of archaeological and historical sensitivity. Potential direct and indirect impacts are summarized in Table 4.3.2.14-2. Anticipated extensions of the airfield impact a moderately sensitive area around a playa. Similar areas are scattered through the southern part of the suitability zone; its eastern edge passes through highly and moderately sensitive areas along Rita Blanca Creek.

Direct adverse impacts to architectural resources occur in Middle Water. Population increase in Dalhart may also impact architectural resources. Population increase in the Dalhart area will result in indirect impacts to cultural resources in the area, particularly along Rita Blanca and Punta de Agua Creeks. One National Register site, Landergin Mesa, may also be subject to indirect impacts.

Mitigation of direct impacts can be accomplished in a similar manner to those at the Clovis OB. The close proximity of Punta de Agua Creek to the construction area renders resources there sensitive to short- and long-term indirect impacts; data recovery may be required to prevent this. Impacts to architectural resources may be mitigated by preservation of significant structures and design of new buildings in accordance with existing styles.

ALTERNATIVE 8 (4.3.2.14.10)

DDA Impacts

Figures 4.3.2.14-10 and 4.3.2.14-11 show the relationship between known and predicted sensitive areas for cultural resources and the conceptual project configuration where the DDA is split between the states of New Mexico, Nevada, Texas, and Utah.

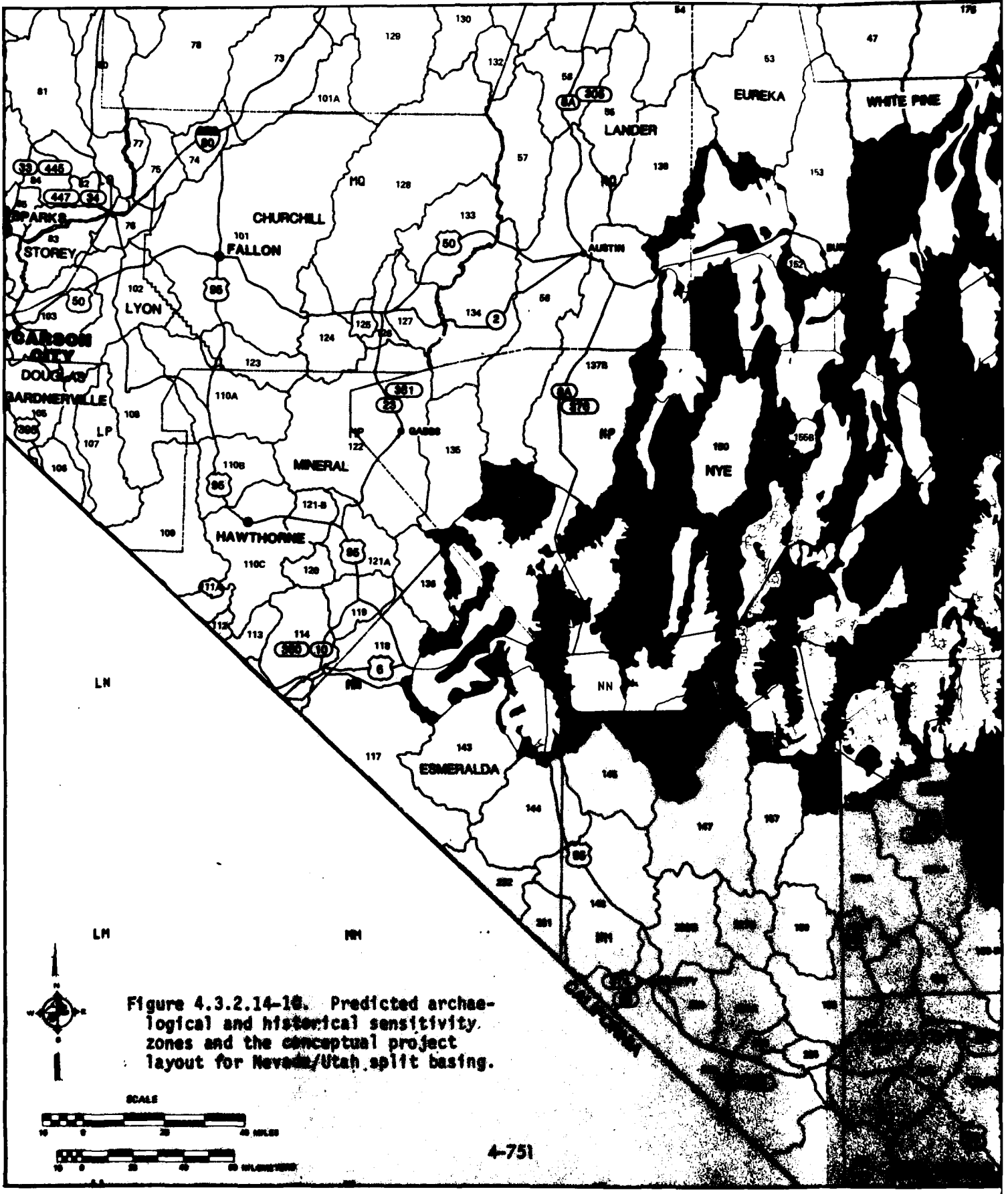
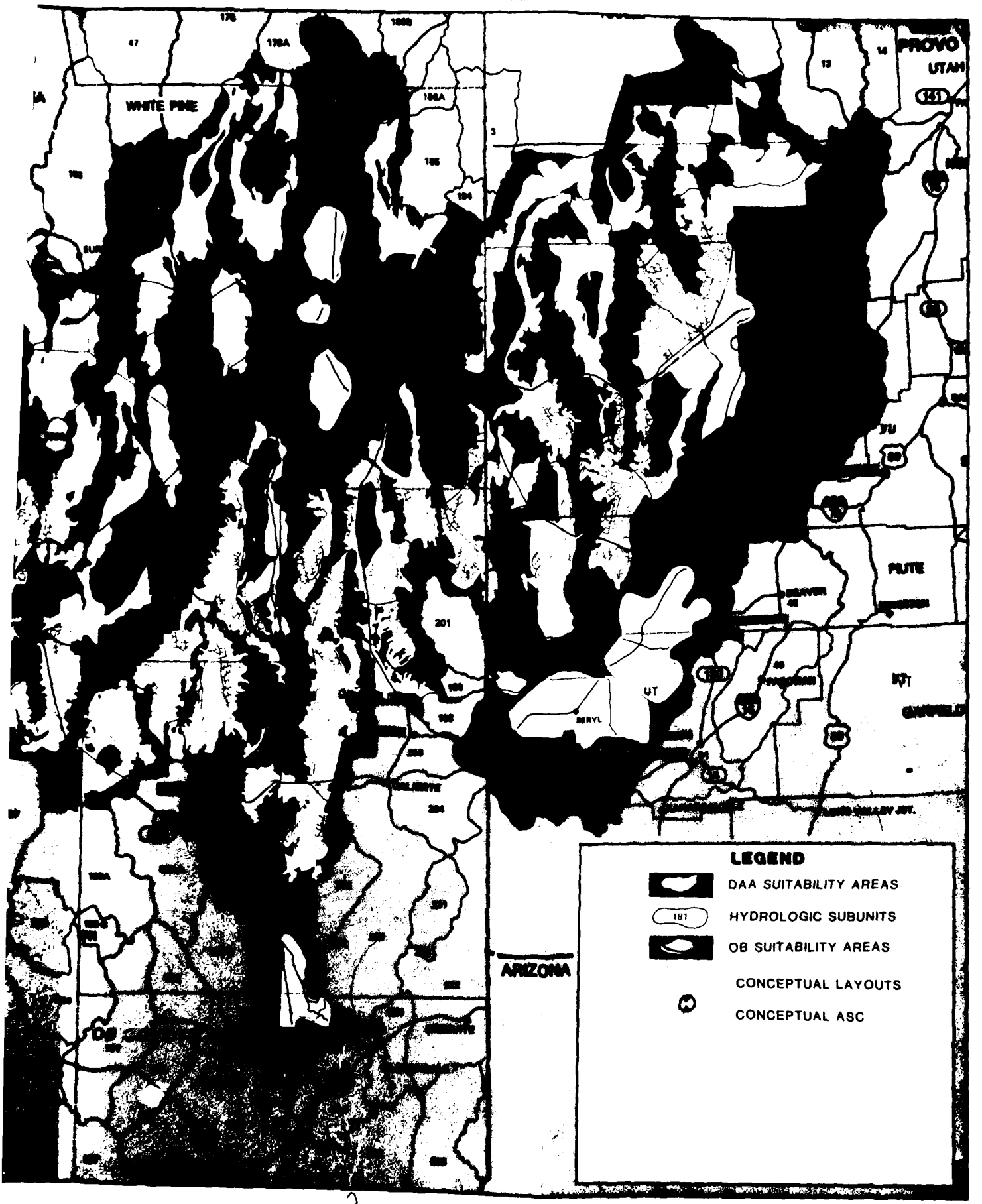


Figure 4.3.2.14-16. Predicted archaeological and historical sensitivity zones and the conceptual project layout for Nevada/Utah split basing.


WHITE PINE
PROVO
UTAH
PIUTE
UT
BERYL
ARIZONA
LEGEND
DAA SUITABILITY AREAS
181
HYDROLOGIC SUBUNITS
OB SUITABILITY AREAS
CONCEPTUAL LAYOUTS
CONCEPTUAL ASC

2

3222-D

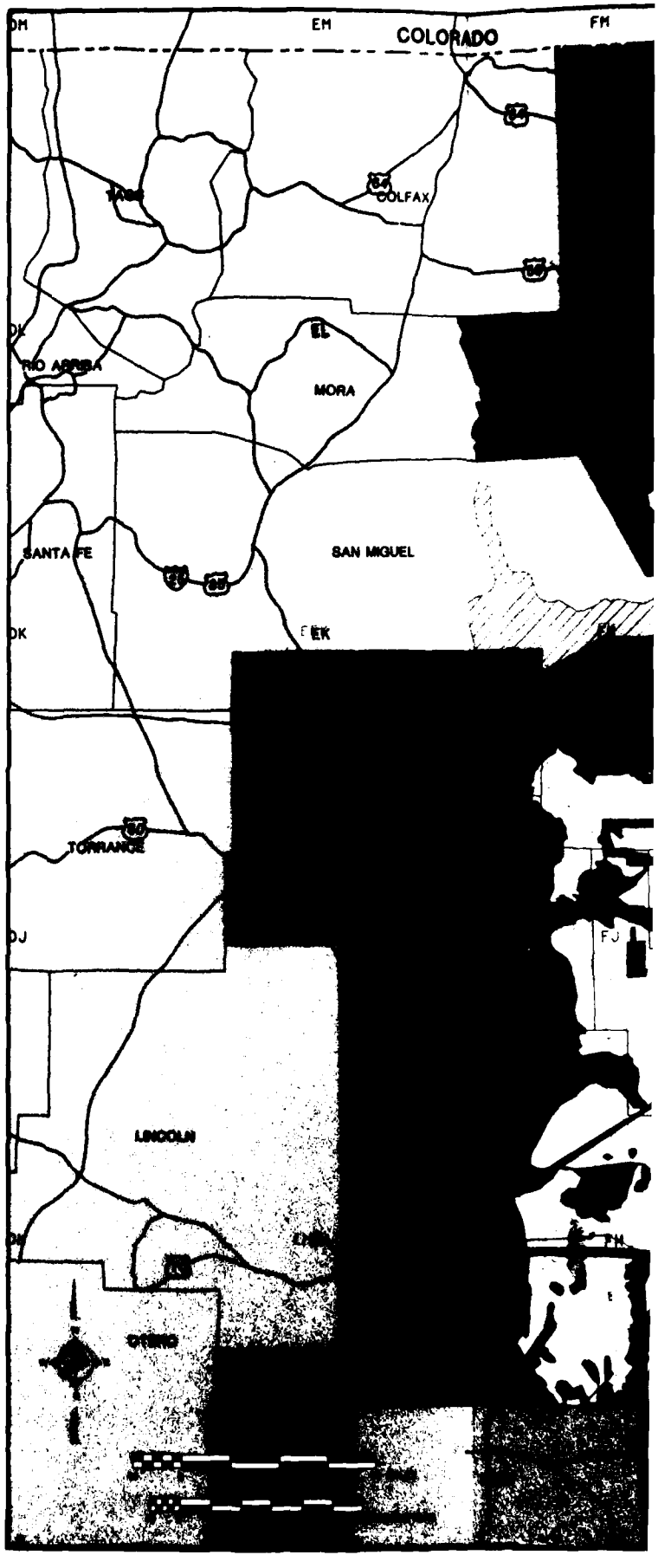
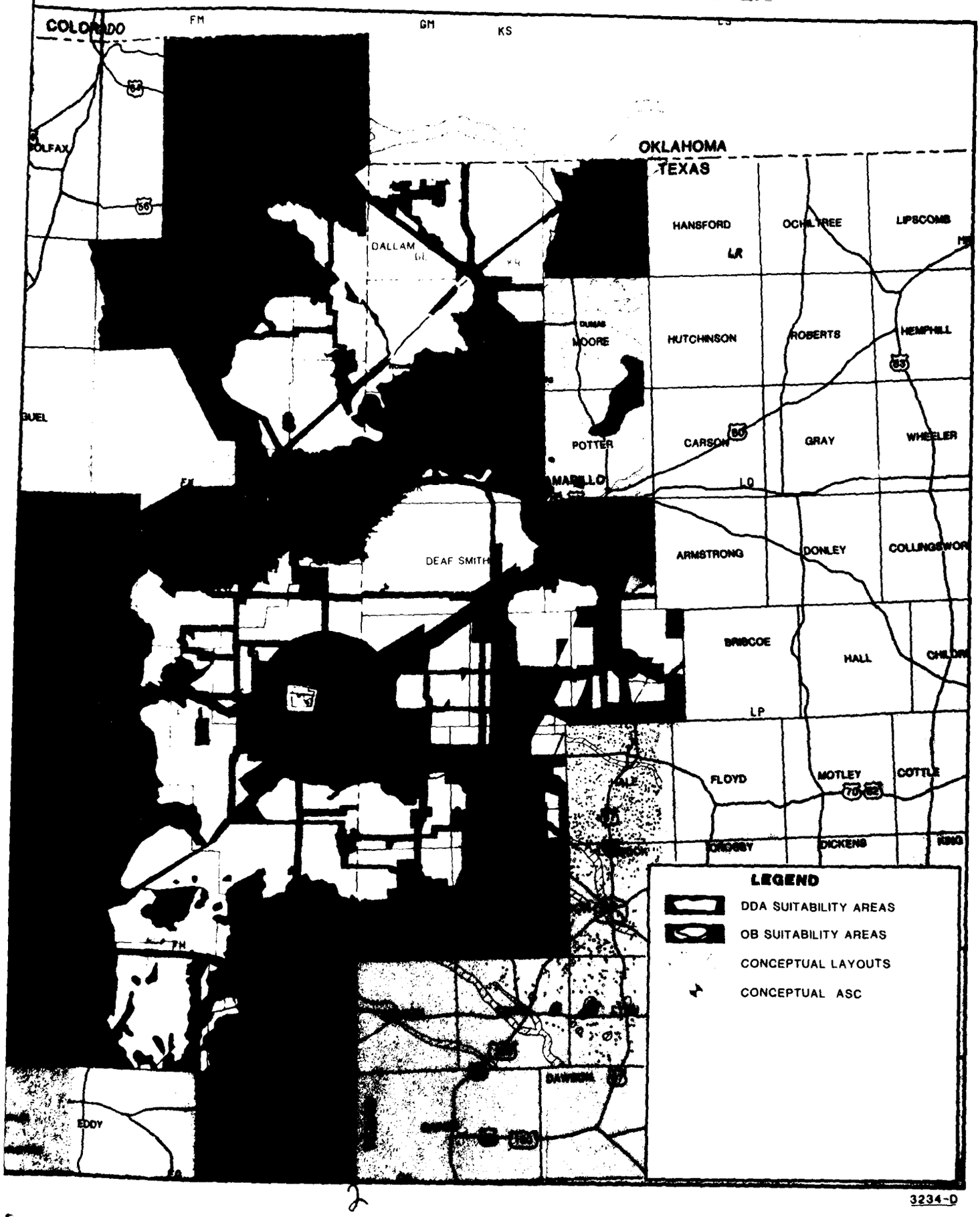


Figure 4.3.2.14-11. Relationship between areas of high archaeological and historical sensitivity--alternative 8, Texas/New Mexico.


COLORADO
KS
OKLAHOMA
TEXAS
HANSFORD
OCHILTREE
LIPSCOMB
DALLAM
MOORE
HUTCHINSON
ROBERTS
HEMPHILL
POTTER
CARSON
GRAY
WHEELER
ARMSTRONG
DONLEY
COLLINGSWOR
DEAF SMITH
BRISCOE
HALL
FLOYD
MOTLEY
COTTLE
CROSBY
DICKENS
EDDY
LEGEND
DDA SUITABILITY AREAS
OB SUITABILITY AREAS
CONCEPTUAL LAYOUTS
CONCEPTUAL ASC

3234-D

Construction of half of the M-X system in each of the potential siting regions would result in somewhat greater total surface disturbance, but the land area disturbed within a single region would be significantly lower. The proposed layout for Nevada/Utah would not result in any direct impacts to current National Register properties, though indirect impacts would be likely at the Topaz War Relocation Center, White River Narrows Archaeological District, Tybo Charcoal Ovens, and the mining towns of Bristol Wells and Delamar. Direct and indirect impacts to historic and architectural resources are expected, but because of the reduced geographic extent, smaller area of disturbance, and lower percentage of population increase the magnitude of the impacts to historic properties would be significantly reduced. Predicted direct impacts to archaeologically and historically sensitive areas are summarized in Table 4.3.2.14-4.

Table 4.3.2.14-4 also summarizes the predicted impacts to archaeological and historical resources as a result of split-basing M-X deployment. This alternative reduces impacts on the Llano Estacado in Texas, particularly to the highly archaeologically sensitive draws in that area. However, split basing does not reduce potential impacts to National Register sites over the full basing option. Probable architectural impacts as a result of population increase are also reduced.

Reduction of the magnitude of potential impacts reduces the likelihood that classes of resources such as surface artifact scatters or ghost towns will be subjected to high rates of destruction. Reduction of project scale can increase the likelihood that an effective mitigation program can be planned and implemented.

Operating Base (OB) Impacts

Impacts from construction of an operating base at Coyote Spring are the same as those discussed for the Proposed Action. Impacts for an OB at Clovis were discussed for Alternative 7.

Table 4.3.2.14-4. Potential impact to archaeological and historical resources in Nevada/Utah and Texas/New Mexico DDAs for Alternative 8.

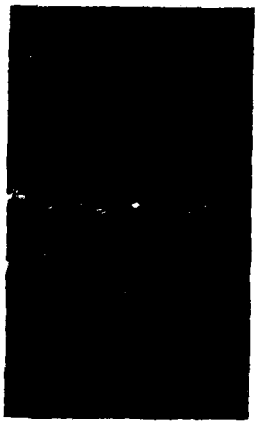
HYDROLOGIC SUBUNIT OR COUNTY		RELATIVE SENSITIVITY[1]	SHORT-TERM EFFECTS			LONG-TERM EFFECTS
			DISTURBANCE OF ARCHAEOLOGICAL AND HISTORICAL SENSITIVITY AREAS (SQ MI)		POTENTIAL IMPACT[1]	POTENTIAL IMPACT[1]
NO.	NAME		MODERATE TO HIGH	LOW		
	Subunits or Counties with M-X Clusters and DTN					
4	Snake		1.8	11.3		
5	Pine		1.0	10.5		
6	White		0.8	1.4		
46	Sevier Desert		1.1	14.0		
46A	Sevier Desert-Dry Lake[2]		1.8	8.0		
54	Wah Wah		5.2	12.9		
155C	Little Smoky—Southern		2.1	3.0		
156	Hot Creek		5.6	10.1		
170	Penoyer		1.6	12.2		
171	Coal		3.6	7.9		
172	Garden		2.0	8.7		
173A	Railroad—Southern		3.0	15.6		
173B	Railroad—Northern		—	—		
180	Cave		1.1	5.8		
181	Dry Lake[2]		5.0	16.6		
182	Delamar		0.9	5.7		
183	Lake		2.7	8.2		
184	Spring		0.8	3.8		
196	Hamlin		5.0	9.5		
202	Patterson		0.5	1.8		
207	White River		3.0	12.4		
208	Pahroc		0.7	0.3		
	Bailey, TX		0.9	—		
	Cochran, TX		4.3	—		
	Dallam, TX		17.8	—		
	Deaf Smith, TX		18.0	—		
	Hartley, TX[2]		17.8	—		
	Hockley, TX		1.2	—		
	Lamb, TX		0.6	—		
	Oldham, TX		1.8	—		
	Chaves, NM		37.5	—		
	Curry, NM		3.6	—		
	DeBaca, NM		4.5	—		
	Harding, NM		16.2	—		
	Lea, NM		1.3	—		
	Quay, NM		23.5	—		
	Roosevelt, NM[2]		14.7	—		
	Union, NM		12.6	—		
	Other Affected Subunits or Counties					
	Castro, TX		—	—		
	Moore, TX		—	—		
	Potter/Randall, TX		—	—		
	Sherman, TX		—	—		
	Yoakum, TX		—	—		
	Guadalupe, NM		—	—		
	San Miguel, NM		—	—		
	Cimarron, OK		—	—		
	Overall DDAs		—	—		

3916-2

[1] No impact. Low impact. Moderate impact. High impact.

[2] Conceptual location of Area Support Centers (ASCs).

Paleontological Resources



PALEONTOLOGY

INTRODUCTION (4.3.2.15.1)

This EIS uses literature research and projections based upon geologic features of known locations to predict potential locations of paleontological resources. Tier Two environmental analysis will be used for site-specific identification of paleontological resources. These potentially sensitive areas are identified for application of mitigation measures. Information on valley bottom occurrences, where most M-X disturbance occurs, is sparse. Pleistocene lakes have a high potential for containing fossils (Figure 4.3.2.15-1).

All potential fossil localities are considered significant because of the current lack of data and the value that any fossil find would have. Vertebrate fossils would have the most value because of their use in determining climate, correlation between valleys, age dating, dispersion patterns, and speciation (Madsen, 1980).

PROPOSED ACTION (4.3.2.15.2)

DDA Impacts

Excavation and construction activity has the potential for destroying paleontologic resources. In addition, the M-X program will increase the population of the area and improve access which will lead to increased casual collection of fossils (Reppenning, 1980). Impacts from construction and excavation will occur only during the M-X construction period while those of increased collection would accrue for the entire life of the project. Paleontologic resources are non-renewable, once destroyed or removed from context without cataloging their value is destroyed.

Paleontologic resources are protected by state law in Utah and afforded some protection by the Federal Antiquities Act. Destruction of the resources is therefore against the law. The fossils do not have to be preserved in place; i.e., avoided. Salvaging the fossils encountered for future study is a viable alternative.

Coyote Spring Valley OB9 Impacts

The Coyote Spring operating base is located near the channel of the ancestral White River. When the White River was flowing during Pleistocene time it cut

through deposits of older lake bed sediments in the bottom of Coyote Spring Valley. While fossils are not known from these sediments they are potentially fossil bearing. Just south of Coyote Spring Valley the river bed cuts through the Muddy Creek formation that near Moapa contains vertebrate fauna. The OB site is very close to this outcrop. Paleozoic rocks contain fossils outcrop in the mountains east and west of Coyote Spring Valley.

Milford OB Impacts

The Milford OB siting area is located on alluvial valley fill in an area that at one time was inundated by Lake Bonneville. Lake Bonneville was a large lake that covered much of the Utah Basin and Range during the late Pleistocene, up to about 10,000 years ago. Important vertebrate fossils have been found in scattered locations in the Bonneville sediments. The disturbance of Bonneville sediments through excavation has the potential for impacting fossils contained in the sediment. Sites proposed for excavation or earth moving activities will be examined as part of Tier Two to determine the possible presence of fossil material.

ALTERNATIVE 1 (4.3.2.15.3)

The DDA layout for Alternative 1 is the same as the Proposed Action. The impacts are therefore the same.

The impacts of the Coyote Spring base site are the same as the Proposed Action.

The Beryl base site is located in an area that is geologically similar to the Milford base site and the anticipated impacts are the same.

ALTERNATIVE 2 (4.3.2.15.4)

The DDA layout for Alternative 2 is the same as the Proposed Action. The impacts are therefore the same.

The impacts of the Coyote Spring base site are the same as the Proposed Action.

The Delta base site is geologically similar to the Milford base site and the anticipated impacts are the same.

ALTERNATIVE 3 (4.3.2.15.5)

The DDA layout for Alternative 3 is the same as the Proposed Action. The impacts are, therefore, the same.

The Beryl OB site is geologically similar to the Milford site and expected impacts are the same.

Along the edge of Steptoe Valley between Ely and the proposed operating base are outcrops of the Sheep Pass Formation. Some of these outcrops contain fossils and one vertebrate fossil has been found. Paleozoic rocks outcropping in the mountain ranges east and west of the valley contain an assortment of fossils.

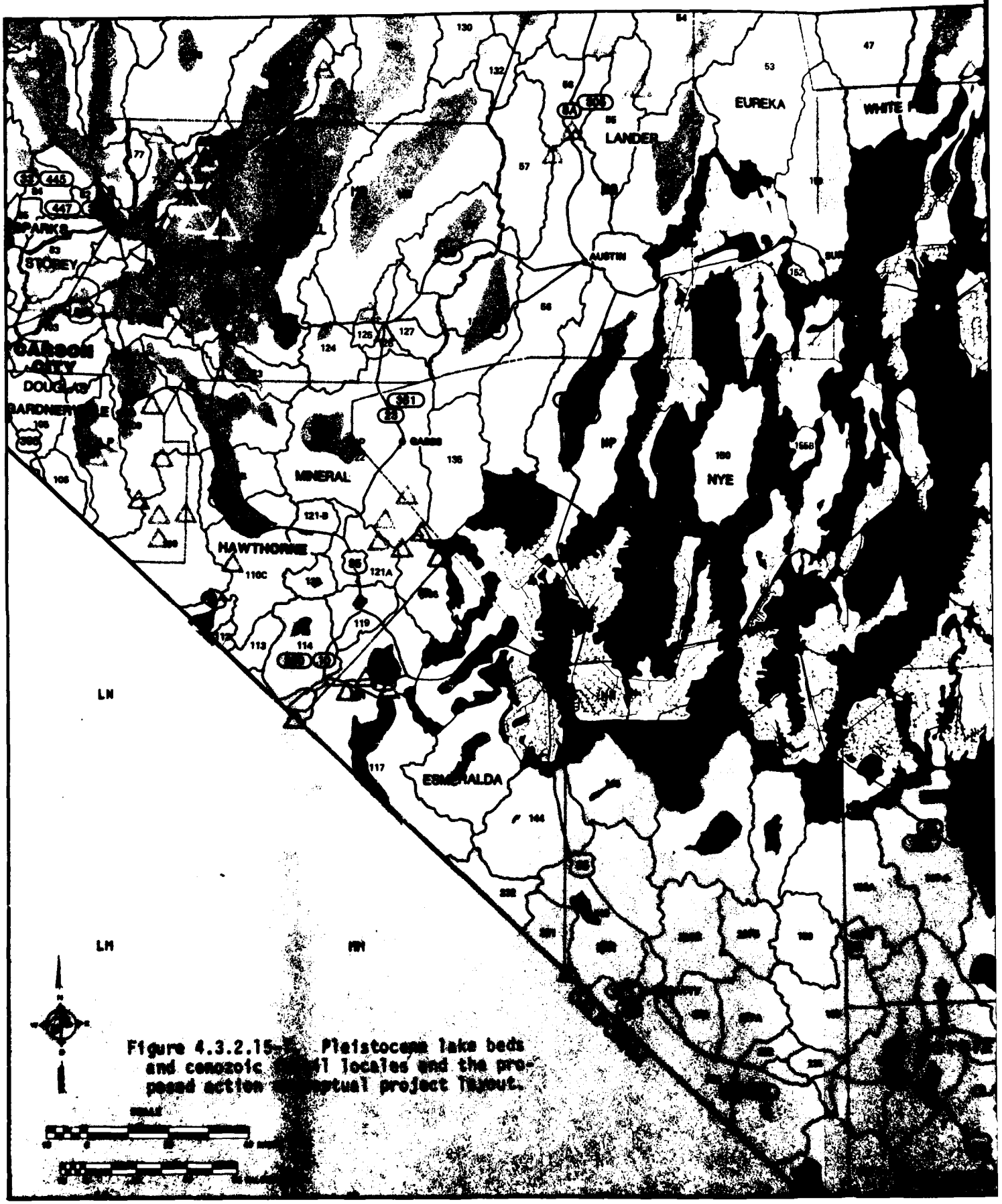
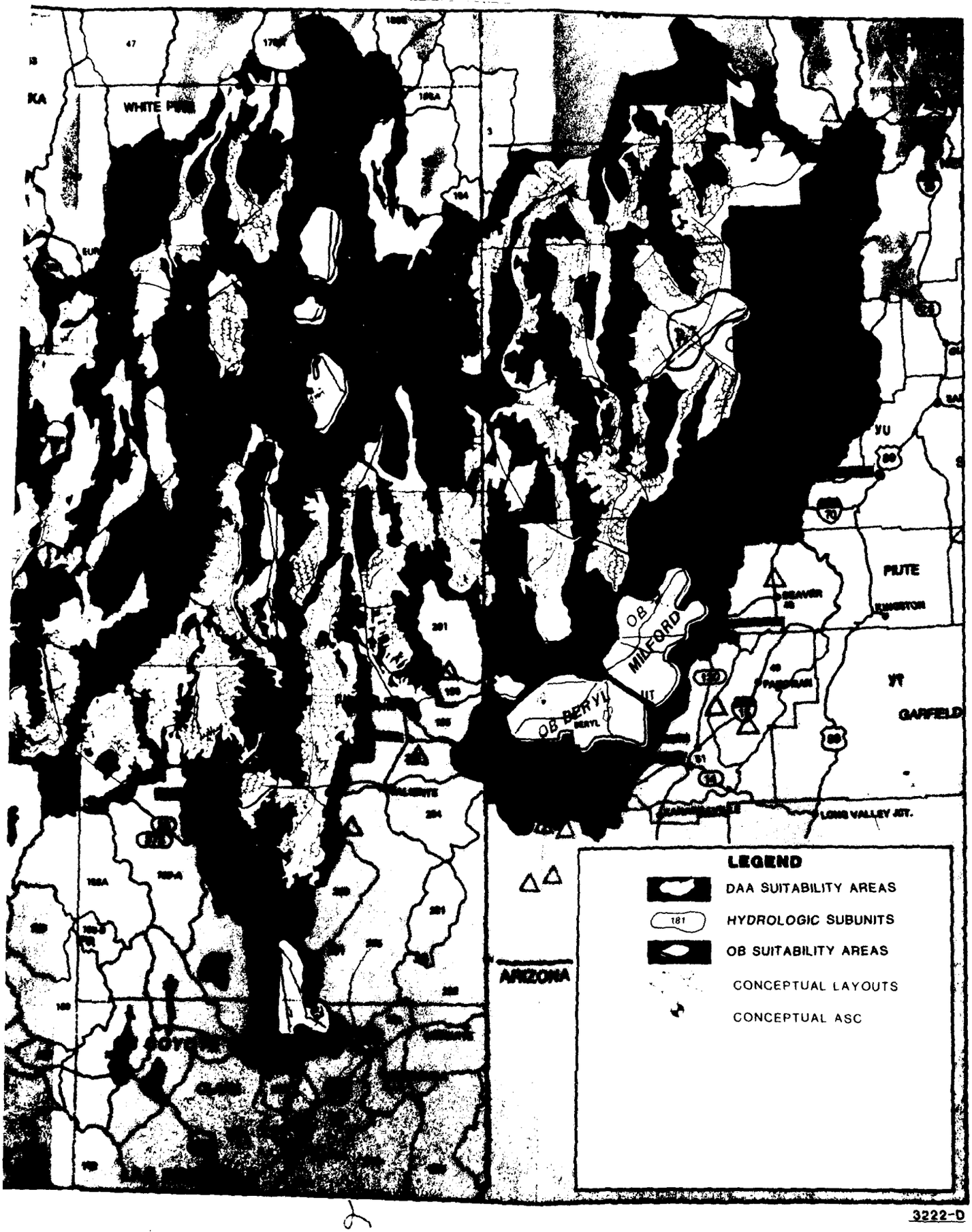


Figure 4.3.2.15-[illegible] Pleistocene lake beds and cenozoic [illegible]l localies and the proposed action [illegible]ptual project layout.


WHITE PINE
OB MILFORD
OB BERYL
PIUTE
GARFIELD
LONG VALLEY JCT.
ARIZONA
LEGEND
DAA SUITABILITY AREAS
181
HYDROLOGIC SUBUNITS
OB SUITABILITY AREAS
CONCEPTUAL LAYOUTS
CONCEPTUAL ASC

3222-D

ALTERNATIVE 4 (4.3.2.15.6)

The DDA layout for Alternative 4 is the same as the Proposed Action. The impacts are, therefore, the same.

The impacts for the Beryl and Coyote Spring OB sites have been discussed previously.

ALTERNATIVE 5 (4.3.2.15.7)

The DDA layout for Alternative 5 is the same as the proposed action. The impacts are, therefore, the same.

The potential impacts of Milford and Ely OB sites are noted above.

ALTERNATIVE 6 (4.3.2.15.8)

The DDA layout for Alternative 6 is the same as the Proposed Action. The impacts are, therefore, the same.

The impacts of the Milford and Coyote Spring OB sites have been discussed.

ALTERNATIVE 7 (4.3.2.15.9)

The DDA for Alternative 7 is located on the surface of the high plains. The surface of the high plains is dotted with Pleistocene lake deposits that are known to contain fossils. The most important of these fossils are associated with Paleo-Indian artifacts and are very important in the study of early man. The Pleistocene deposits are scattered throughout the siting area and could be encountered anywhere. The issues related to paleontologic resources are the same as those discussed under the Proposed Action.

The Clovis operating base is located about 35 mi (55 kilometers) from the western escarpment of the High Plains. Fossil occurrences along the western escarpment are not common and consist mostly of gastropods and seeds.

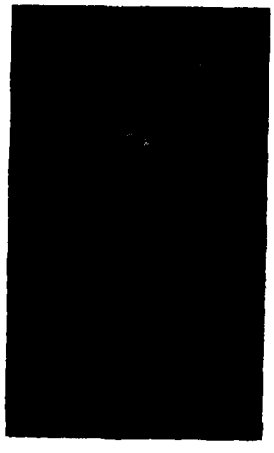
The operating base at Dalhart is located 80 mi (130 kilometers) west of the important vertebrate fauna localities in Hemphill County. The Hemphillian fauna is found in the upper 150 feet of the Ogallala Formation and could be found in the Dalhart area. Pleistocene deposits on top of the Ogallala could also contain fossils.

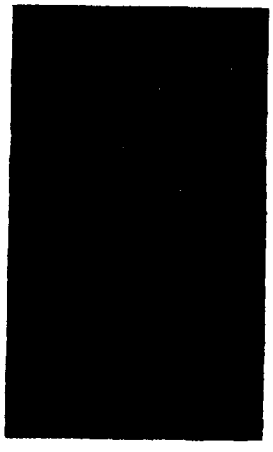
ALTERNATIVE 8 (4.3.2.15.10)

By reducing to one half the size of the M-X project in each of the alternative areas, a decrease in the impacts to the paleontologic resources would be expected in each area. These would be accomplished not only by the reduction in the number of facilities but also by the increased ease of mitigation by avoidance. A decrease in the intensity of indirect impacts to the Paleozoic fossils in Nevada and Utah could be expected because of the decrease in imported population.

Impacts at the Coyote Spring Valley and Clovis OB sites have been discussed previously and do not change for this Alternative.

Construction Resources





CONSTRUCTION RESOURCES

INTRODUCTION (4.3.2.16)

M-X will require large quantities of several construction resources. Resources that have been examined include cement, steel, concrete blocks, fly ash, asphaltic oil, aggregate, lumber, roofing asphalt, sheet metal, water and labor. Water and labor are specifically addressed in other sections of this chapter. The remaining construction resources, except cement, were determined to not be significantly impacted.

Cement industry impacts have been estimated through a series of equations that estimate price changes resulting from different demand levels (Frank K. Stuart & Associates, 1980). For each study area an 11-state M-X cement supply region has been defined consistent with Air Force policy statements. This larger-than-typical supply area would be utilized to minimize the potential impacts of M-X construction. For alternatives including Nevada/Utah deployment, these supply area states are Arizona, California, Colorado, Idaho, Montana, Oregon, Nevada, New Mexico, Utah, Washington, and Wyoming. For alternatives involving Texas/New Mexico, the supply area states are Arizona, Arkansas, Colorado, Kansas, Louisiana, Mississippi, Missouri, Oklahoma, New Mexico, Texas, and Utah.

Cement requirements result from concrete requirements for protective structures, various project buildings including ASC, base housing and office areas, and the airfield among others. In addition, cement will be used in the construction of indirect supporting infrastructure facilities such as community housing, industrial and commercial facilities. While project requirements can be estimated and scheduled with a reasonable degree of confidence, indirect requirements cannot. Indirect requirements were estimated to be equal to the direct requirements for living and work areas of the operating bases . Given that the project requirement includes housing and work areas (including both commercial and industrial work areas) for 20,000 - 25,000 people, this approach should capture the cement requirement for 9,000 to 10,000 additional people and leave a fair overage so that impacts are not under estimated. For this analysis, indirect requirements are assumed to occur in the same year as direct requirements. A lag could reduce the expected level of impacts.

PROPOSED ACTION (4.3.2.16.2)

The key project actions that require cement are construction of 4,600 protective structures (primarily concrete), two airfields (primarily concrete), and foundations for numerous other buildings such as housing, office areas, industrial areas, commercial areas and in the DDA, area security centers (ASCs). Community growth will result in secondary construction of housing, commercial and industrial areas and related infrastructure support facilities. Cement requirements during the construction period are graphed in Figure 4.3.2.16-1.

The peak requirement occurs in 1986 at 435,000 tons of cement. This level, which is a sharp increase from the preceeding year, is expected to decline somewhat over the next two years and then end with the end of the major construction effort in 1989. No long-term impacts are anticipated.

In December 1979, the 11-state cement supply area had a plant capacity of 19.2 million tons. Announced additions to this capacity will amount to an additional 4.6 million tons (Portland Cement Association, 1979). Thus M-X will require slightly over 2 percent of current capacity and slightly less than 2 percent of projected capacity. In Utah alone, capacity additions of 1.7 million tons have been announced. Any one of the three plants could supply the entire M-X peak year requirement from new capacity alone (Portland Cement Association, 1979).

While the impact of M-X demand is small in relative if not absolute terms, any project of this size will have an impact on regional supply. Supply shortages are typically met through price increases. Projected M-X related impacts on regional cement prices are shown in Figure 4.3.2.16-2. These impacts are small, but significant. They are small in that they are within the confidence interval for the no M-X projection (which is heavily dependent on projection of gross national produce and fuel costs). Price impacts peak at an additional $2.26 per ton or 2.6 percent of the anticipated price without M-X. They are significant in that they are in addition to any other inflation related impacts. In addition, M-X related price increases will result in a decline of non-M-X cement use of about one percent. Total cement use, including M-X, will increase but non-M-X cement use will decline slightly due to higher prices.

A major mitigative action has already been incorporated in project planning in that an 11-state supply area is to be used. A more traditional supply area restricted to a 150-mi radius from the project would result in higher local price effects that could be significant. The cost to the Air Force of mitigating local impacts by using such a large supply area will itself be significant in that the transportation costs of shipping cement from Denver to Salt Lake City by rail currently run about $21 per ton.

An additional mitigation that could prove cost effective for the Air Force, for local consumers, and for regional producers, would be for the Air Force to stockpile cement prior to the 1986-1988 heavy use period. Acquisition of 200,000 tons a year for the 1983-1985 period would leave a surplus of almost 300,000 tons that could be drawn against during the three heavy use years.

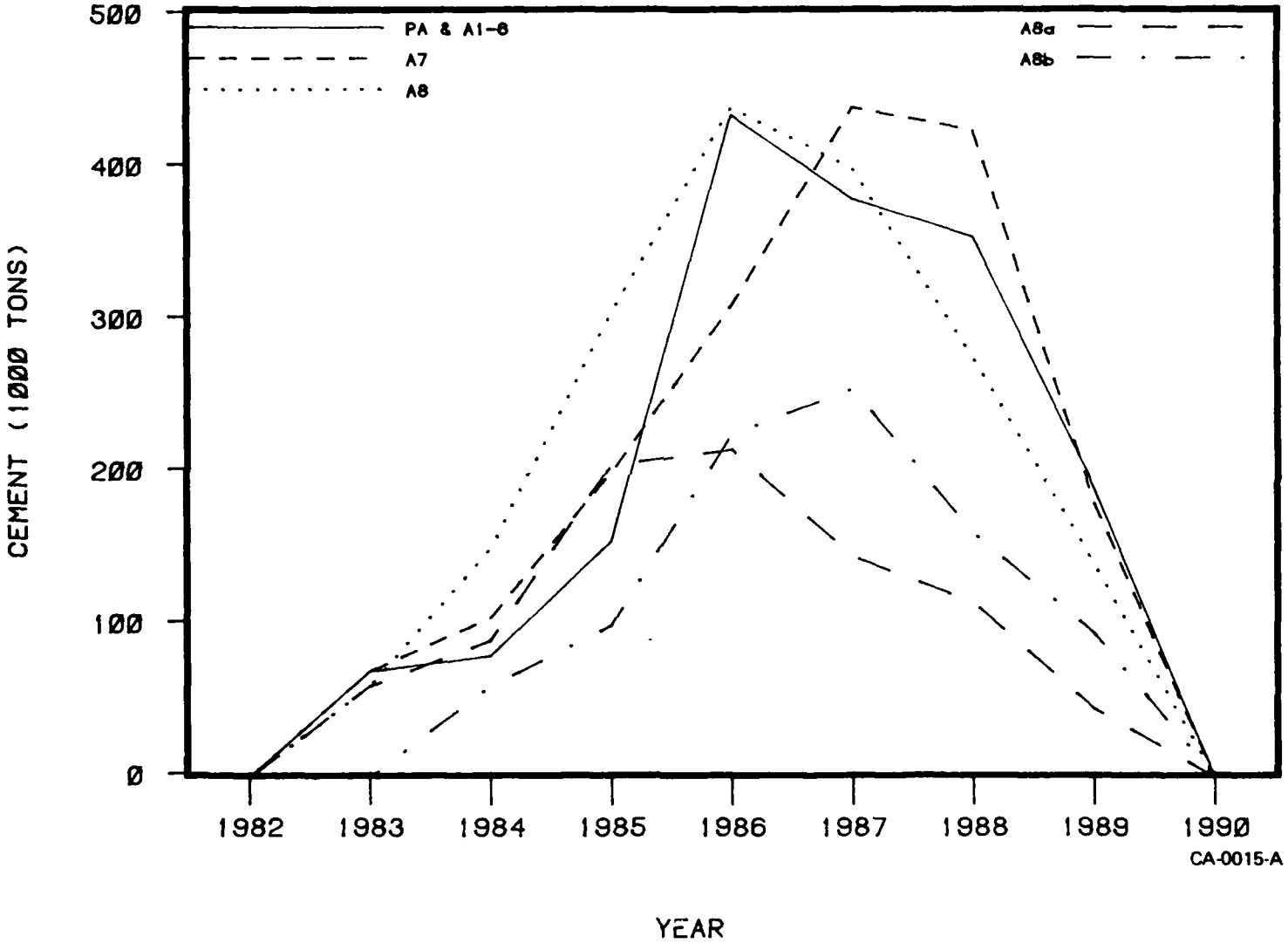


Figure 4.3.2.16-1. Direct and indirect M-X cement requirements.

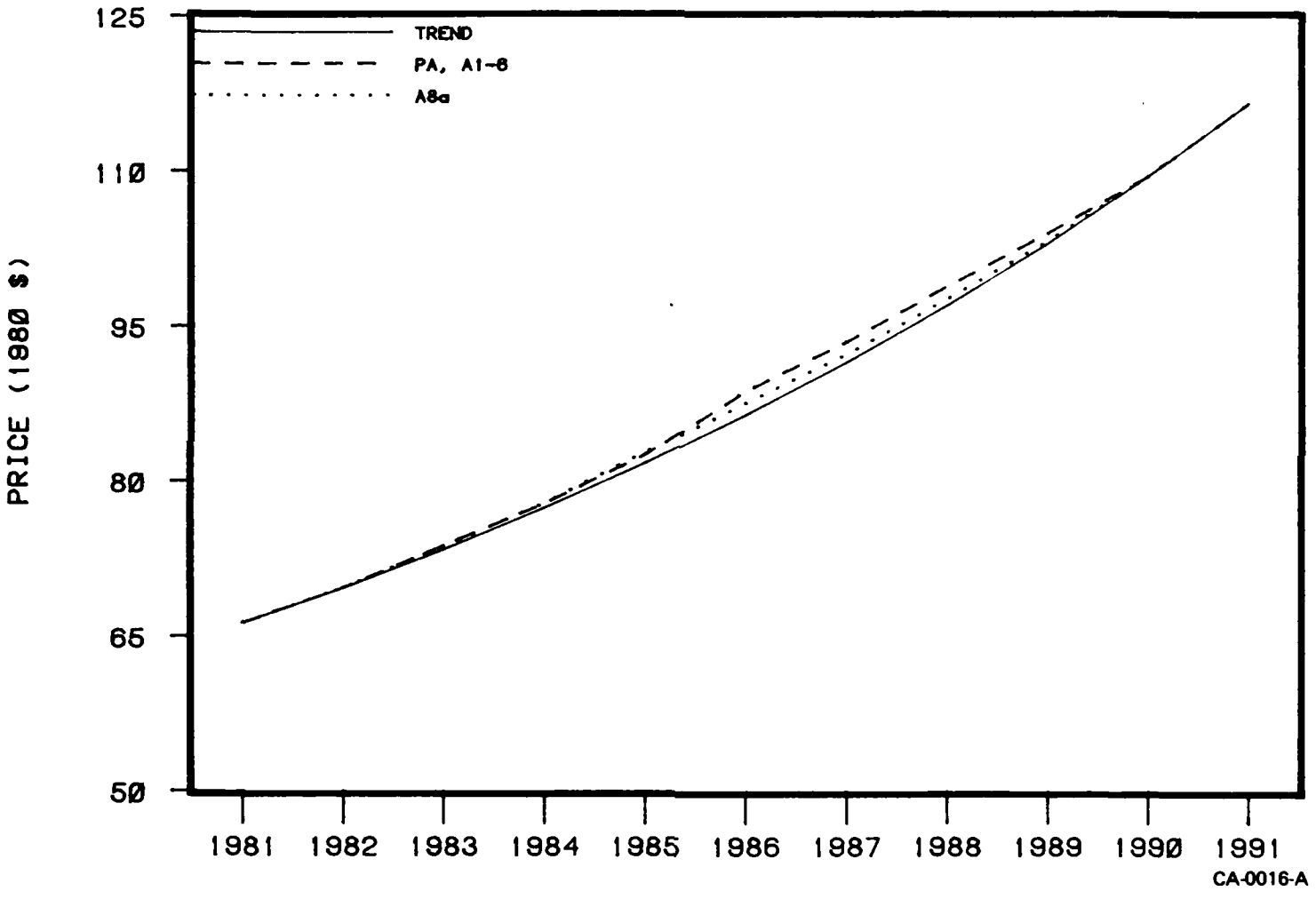


Figure 4.3.2.16-2. Cement price impacts - Nevada/Utah region.

ALTERNATIVE 1 (4.3.2.16.3)

Impacts would be identical to those for the Proposed Action.

ALTERNATIVE 2 (4.3.2.16.4)

Impacts would be identical to those for the Proposed Action.

ALTERNATIVE 3 (4.3.2.16.5)

Impacts would be identical to those for the Proposed Action.

ALTERNATIVE 4 (4.3.2.16.6)

Impacts would be identical to those for the Proposed Action.

ALTERNATIVE 5 (4.3.2.16.7)

Impacts would be identical to those for the Proposed Action.

ALTERNATIVE 6 (4.3.2.16.8)

Impacts would be identical to those for the Proposed Action.

ALTERNATIVE 7 (4.3.2.16.9)

Project actions and indirect growth that produce increased demands on the cement industry are comparable for the Texas/New Mexico potential deployment area to those discussed for the Nevada/Utah potential deployment area. Differences in construction schedules result in the later peak requirement year shown in Figure 4.3.2.16-1. Although the 1987 peak of 440,000 tons is slightly higher than that for the Proposed Action, no long term impacts are anticipated.

Texas is the national leader in cement production with over 10 million tons annual capacity in 1979. The proposed 11-state M-X supply area had a plant capacity of 27.4 million tons in December 1979 and announced planned additions to this capacity equal 5.6 million additional tons (Portland Cement Association, 1979). Thus M-X will require about 1.5 percent of existing or planned capacity. Any one of four planned new plants in Texas alone could supply the entire M-X peak year requirement.

While the impact of M-X demand is even smaller in relative terms than in Nevada/Utah, the large absolute requirement will have an impact on regional prices. Projected M-X related impacts on regional cement prices are shown in Figure 4.3.2.16-3. These impacts are very small, about 0.5 percent at the peak, and are not significant within the supply region.

ALTERNATIVE 8 (4.3.2.16.10)

Deployment of half the M-X system in each region will result in slightly higher total cement requirements since a second DDA will be required. Peak years are the

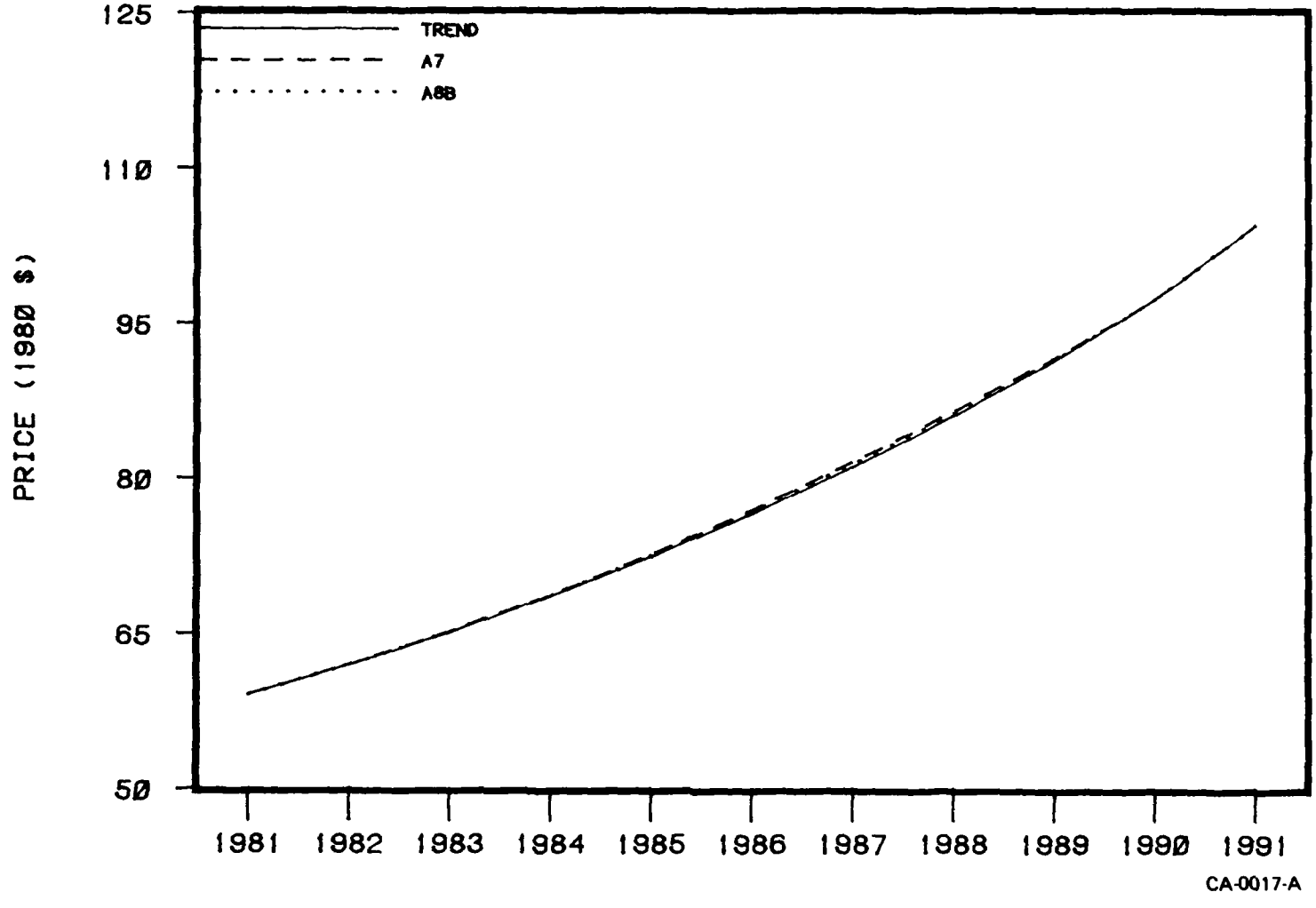


Figure 4.3.2.16-3. Cement price impacts Texas/New Mexico region.

same as with the Proposed Action and Alternative 7 respectively for Nevada/Utah and Alternative 8 for Texas/New Mexico. Requirements in each region are about half the corresponding regional full deployment requirement. No long-term impacts are anticipated and no significant impacts are anticipated in Texas/New Mexico. Effects are shown in Figure 4.3.2.16-3.

Impacts in Nevada/Utah are probably not significant although this judgement is not clear cut. About one percent of the regional production capacity would be used. Regional price impacts would be about half those that would occur under the Proposed Action (Figure 4.3.2.16-2). In 1986, non-M-X related cement consumption would decline about 100,000 tons or about 0.5 percent of projected consumption without M-X.

Mitigation by use of a large supply area is already incorporated in project planning and the preceeding estimates. Stockpiling would be a much less useful mitigation than in the Proposed Action or other alternatives because the regional peaks are not so dramatic with split basing.

Other Impacts

OTHER IMPACTS

WATER QUALITY (4.4.1)

Nevada/Utah Regional Impacts

Construction of roads and shelters is expected to slightly increase surface water quantity by increasing runoff. Disturbed areas would be at elevations above 5,000 feet. The compaction of soil for road construction would alter the moisture-holding and runoff characteristics of the soils and would thereby increase runoff. This compaction can create higher flood peaks at downstream locations, such as at road crossings.

Disturbance of soil may expose fresh mineral surfaces to oxidation and thereby increase their solubility. The percentage of disturbed land would be small, however, and the expected increase in dissolved solids from surface runoff would be minor.

Diversion of surface runoff may, because of road and shelter construction, reduce the quantity of water that normally recharges the valley-fill aquifer. This impact is expected to be insignificant, however, because the diversion of water is seasonal and would capture much of the water that would normally run off to the playas and be lost through evaporation.

Depending upon the approach used in obtaining a water supply, the system's consumption could either favorably or adversely affect water supply quality in siting araes. If water is obtained through the purchase or lease of existing irrigation water rights, and the irrigated land is temporarily retired from agriculture, it is likely that the total dissolved solids load in the groundwater would decline as the leaching of irrigation water containing fertilizers would have been decreased. Conversely, if the amount of groundwater extracted is increased by M-X usage, and the rate of irrigation remains the same, the total dissolved solids load in the groundwater would increase at about the same or at a slightly higher rate than before the MX withdrawals. No appreciable adverse effect on water quality from M-X withdrawals is expected.

Texas/New Mexico Regional Impacts

Construction of roads and shelters would be expected to slightly increase the surface water quantity by increasing runoff. The compaction of soil for road construction would alter the moisture-holding and runoff characteristics of the soils and would thereby increase runoff. This compaction can create higher flood peaks at downstream locations, such as at road crossings.

Disturbance of soil may expose fresh mineral surfaces to oxidation and thereby increase their solubility. The percentage of disturbed land would be small, however, and the expected increase in dissolved solids from surface runoff would be minor.

Diversion of surface runoff may, because of road and shelter construction, reduce the quantity of water that normally recharges the aquifers. This impact is expected to be insignificant.

Operating Base Impacts

Beryl

Construction activities will have effects upon the quality of surface waters. Most of these effects can be minimized through proper construction methods.

Construction of an operating base near Beryl will use an estimated 1,800 to 3,400 acre-ft of water. Permanent operational water requirements will be in the range of 3,700 to 4,800 acre-ft per year. Construction and maintenance of the opreating base could have an impact on surface water due to increases in flooding and erosion. Storm runoff will be increased by the introduction of impermeable surfaces and channelization. General clearing, leveling and earth moving activities will be responsible for the disturbance of the soil system. The main activities include leveling and clearing, and earth moving. The exposed land surfaces, in combination with concentrated runoff during periods of rainfall, will contribute to increased erosion rates. Undesirable effects of accelerated erosion include soil loss and water quality degradation of nearby drainage systems. In steep terrain, erosion, as a consequence of excavation, can be a substantial problem. However, based on the nearby flatlying lands, the potential of erosion as a consequence of earth moving and channeling activities is expected to be reduced. In channeling activities, erosion and sedimentation processes which commonly occur are the same as for natural sources. These are (a) degradation of minor drainage ways, (b) sheet and hill erosion, (c) gully erosion, (d) flood-plain scour, (e) stream bed degradation, and (f) stream bank scour. Most of these methods of erosion may be applied to a soil spoil pile through the channeling process. In the process, the sediment produced may be transported in small streams as wash load and bed load.

In the soil spoil piles, the change in the physical and chemical characteristics of the fence metals varies by the influence of weather, the method of piling, the slope of piles, the nature of the material, and the particle size distribution. Particle size of soil spoil pile varies from large boulders to fine sands. No generalization can be made concerning the typical particle size to be expected in an overburden spoil pile.

Channeling disturbance may divert chemically polluted surface water to other localities where the surface and groundwaters are free from pollution. Generally,

removal or disturbance of soils will enhance the oxidation processes of trace elements due to increased air entrapment and porosity. Some trace elements become more soluble in the oxidized state and leach through the soil faster than normal. On the surface spoil soil forms a permeable crust or layer which also increases hydrolic and aeolian erosion. In filling processes, material used for stabilization, such as rock or soil transported from nearby areas, might introduce chemically and physically different soil characteristics which provide favorable conditions for chemical reactions with local minerals and produce environmentally hazardous chemical components as end products and/or by products of these reactions.

Substances used for road stabilization and dust control could cause a degradation of water quality should they be allowed to enter the surface waters. These will mainly be oils or cements but proper construction methodology can prevent this from occurring. The lessening of the water quality could have serious effects on the aquatic biota and could eventually lead to the contamination of the groundwater supply. Use of the dust control palliative should be avoided on all areas that should be revegeted. The effects of the palliative on any surface besides those of the roads are unknown but suspect.

The effects of increased access upon the surface water quality is difficult to assess at this time but could be detrimental unless some controls are applied. Water quality may be affected by increased sediment loads due to consturction. If surface water rights are purchased, stream volumes may be locally reduced, but reduction of total surface water volume could be partially offset by return flow after treatment, especially during the operations phase.

Personnel and activities associated with M-X construction and operation will generate waterborne wastes. The discharge of these wastes after treatment could have an effect upon the water quality of the surface resources. Possible effects upon the surface water could be a reduction in dissolved oxygen present, an increase in nutrients or the introduction of toxic substances. All these can be avoided by the use of present technology in designing and constructing the waste treatment system.

Discharge of treated effluent may create new surface water resources. The water could provide a positive impact by creating new habit or providing a water source for agriculture.

Coyote Spring

Additional impacts to the groundwater resource include quality deterioration and land subsidence. As water is removed from storage, an hydraulic gradent is created. This gradient causes water to drain from relatively impermeable salt and clay layers which often contain poor quality water because these finer grain layers contain a higher percentage of soluable salts than the more permeable sand and gravel material. If the quality of water from a particular source is already marginal for present uses, M-X-induced development could render the source unfit for those uses and effectively reduce the available supply. A compaction of the underlying strata could occur because of increased withdrawal rate. Land subsidence could occur near wells penetrating thick sequences of poorly consolidated sediments such as the valley-fill aquifers in the Great Basin Region. Associated with compaction could be the loss of interstitial spaces, permanent dewatering of storage volume and loss of permeability resulting permanent well yield reductions.

Delta

Most majority of present water usage is for agriculture in the Delta-Hinckley area. M-X construction and operation water usage would represent about 1.4 percent of present water usage, and it would be anticipated that if the State Engineer granted appropriation rights in nonagricultural areas, additional water-level decline due to the M-X project would be small. Springs in this basin are located above the valley floor and do not appear to be part of the valley-fill aquifer system; therefore the project should have no effect on their discharge rates. Increased surface runoff during major storms would be minimal; local increases in sheet and stream channel erosion may occur. Construction activities could degrade surface-water quality during thunderstorms, but no significant impacts on groundwater quality is expected.

Ely

When compared with the other alternative sites in Nevada/Utah the relative potential for impact at Ely would be low. Mostly because Ely's groundwater resource is currently under less stress than that of any of the other OB site areas. Although Steptoe Valley is a designated critical groundwater basin, current groundwater usage is less than the perennial yield and sufficient quantities may exist for M-X operating base purposes. M-X withdrawals would be temporary and limited to the southern part of the valley. In these areas, widely separated stock wells provide water for the other uses and no significant impact on water levels and groundwater storage from M-X withdrawals would be anticipated. Extractions may reduce underflow to the south through the deep carbonate rocks aquifer. The springs do not appear to be part of the valley-fill aquifer system, so the project should have no effect on their discharge rates. Increased surface runoff during major storms would be minimal; local increases in sheet and stream-channel erosion may occur. Construction activities could degrade surface-water quality during thunderstorms, but no significant impact on groundwater quality would be expected.

Milford

Construction activities will have effects upon the quality of surface water. Most of these effects can be minimized through proper construction methods.

General clearing, leveling, and earth moving activities will be responsible for the disturbance of the soil system. The exposed land surfaces, in combination with concentrated runoff during periods of rainfall, will contribute to increased erosion rates. Undesirable effects of accelerated erosion include soil loss and water quality degradation of nearby drainage systems. In steep terrain, erosion as a consequence of excavation can be a substantial problem. However, based on the nearby flat-lying lands, the potential of erosion as a consequence of earth moving and channeling activities is expected to be reduced.

The M-X facilities will lead to channelization in some areas and rechannelization in others. In channeling activities, erosion and sedimentation processes which commonly occur are the same as for natural sources. These are: (a) degradation of minor drainage ways, (b) sheet and hill erosion, (c) gully erosion, (d) flood-plain scour, (e) stream bed degradation, and (f) stream bank scour. Most of these methods of erosion may be applied to a soil spoil pile through the channeling process. In the

process, the sediment produced may be transported in small streams as wash load and bed load.

To the soil spoil piles, the change in the physical and chemical characteristics of the trace metals varies by the influence of weather, the method of piling, the slope of piles, the nature of the material, and the particle size distribution. Particle size of soil spoil pile varies from large boulders to fine sands. No generalization can be made concerning the typical particle size to be expected in an overburden spoil pile.

Channeling disturbance may divert chemically polluted surface water to other localities where the surface and groundwaters are free from pollution. Generally, removal or disturbance of soils will enhance the oxidation processes of trace elements due to increased air entrapment and porosity. Some trace elements become more soluble in the oxidized state and leach through the soil faster than normal. On the surface spoil soil forms a permeable crust or layer which also increases hydrolic and aeolian erosion. In filling processes, material used for stabilization, such as rock or soil transported from nearby areas, might introduce chemically and physically different soil characteristics which provide favorable conditions for chemical reactions with local minerals and produce environmentally hazardous chemical components as end products and/or by-products of these reactions.

Substances used for road stabilization and dust control could cause a degradation of water quality should they be allowed to enter the surface waters. These will mainly be oils or cements but proper construction methodology can prevent this from occurring. The lessening of the water quality could have serious effects on the aquatic biota and could eventually lead to the contamination of the groundwater supply. Use of the dust control palliative should be avoided on all areas that should be revegetated. The effects of the palliation on any surface besides those of the roads are unknown but suspect.

The effects of increased access upon the surface water quality is difficult to assess at this time but could be detrimental unless some controls are applied. M-X activities will create personnel and activities associated with M-X construction and operation will generate water-borne wastes. The discharge of these wastes after treatment could have an effect upon the water quality of the surface resources. Possible effects upon the surface water could be a reduction in dissolved oxygen present, an increase in nutrients, or the introduction of toxic substances. All these can be avoided by the use of present technology in designing and constructing the waste treatment system.

Discharge of treated effluent may create new surface water resources. The water could provide a positive impact by creating new habitats or providing a water source for agriculture.

Clovis

Annual M-X water usage for construction and operation would represent a minor increase in the region's current depletion rate, so the impact on water levels, underflow, or groundwater storage would be minimal. The current depletion rate of springs supplying running water draw would increase slightly. Increase in surface

runoff during major thunderstorms would be minimal; local increases in sheet and stream-channel erosion may occur. Construction activities could degrade surface-water quality during thunderstorms, but no significant impact on groundwater quality would be expected. Temporary retarding ponds would be constructed to reduce peak flows and to desilt the runoff water to avoid downstream deposition. After completion of the M-X project, the water supply system may be made available for local use.

Dalhart

M-X withdrawals would represent a minor part of the allowable additional development in the region, so no significant impact on water levels, underflow, or groundwater storage would be anticipated. No springs are reported in the region. The increase in surface runoff during major thunderstorms would be minimal; local increases in sheet and stream-channel erosion may occur. Construction activities could degrade surface-water quality during thunderstorms, but no significant impact on groundwater quality would be expected. Temporary retarding ponds would be constructed to reduce peak flows and desilt the runoff water to avoid downstream deposition. After completion of the M-X project, the water supply system may be made available for local use.

OTHER WILDLIFE (4.4.2)

Nevada/Utah Regional Impacts

Effects Common to Many Species. Wildlife habitat loss would result from construction of protective structures, roads, construction camps, gravel pits, security facilities, and communication corridors. Around each protective structure about 7-8 acres of vegetation will be disturbed. One acre of this amount will have vegetation permanently removed. Road building will remove additional vegetation in a band 100 ft (30 m) wide around the roadway. For animals with small home ranges which may be entirely within the cleared area (e.g., lizards, snakes, and rodents), habitat loss will cause mortality directly or indirectly if establishment in adjacent areas is not possible because of competition or marginal habitats.

For animals with larger home ranges (e.g., birds of prey, carnivores, ungulates) habitat lost due to scarification is expected to be less than 5 percent in any hydrologic subunit. Thus, direct habitat loss should have minimal effect on their population numbers. During construction behavioral avoidance of construction activity will significantly increase the amount of habitat lost for some species. The estimated areas lost are presented in the supporting technical reports.

Once construction activities have ceased, only the permanently disturbed areas will be unavailable for use by animals. The temporarily disturbed areas will revegetate naturally or through planned revegetation programs, changing the successional stage of the vegetation. This may cause different animal species to predominate (e.g., jackrabbits prefer disturbed areas; Vorhies and Taylor, 1933). Increased water availability from runoff of rain in areas adjacent to roadways will increase plant productivity and alter plant species composition. These changes could increase herbivore abundance and diversity adjacent to roadways (Cornett, 1980; Leedy, 1978). In turn, carnivores may benefit from the higher concentrations of prey.

Project water use could reduce water available from springs, streams, and ponds. Many animals depend upon these sources for drinking water and reduction in water levels could result in habitat loss. Water table drawdown could reduce aquatic and riparian vegetation which are habitats for some species, particularly songbirds. Animals that live in or near water would suffer population declines as a result of habitat reduction or loss. These species include amphibians, waterfowl, shore birds, muskrat, and beaver.

Noises from vehicles could seriously affect animals. Brattstrom and Bondello (1980) found that certain small desert animals are greatly affected by noise. Larger animals such as ungulates, carnivores, and birds of prey may also be adversely affected by noise and the visual disturbance associated with traffic. These disturbances often result in avoidance of roads and, therefore, loss of habitat near roads (Rost and Bailey, 1979; Basile and Lonner, 1979).

Increases in traffic would increase highway kills of many kinds of animals (Schultz and Bailey, 1978; Allen and McCullough, 1976). Rodents, reptiles, low-flying birds (e.g., horned larks), deer, bighorn sheep, elk, and noctural animals including owls, skunks, and rabbits will be especially vulnerable (McQuivey, 1978; Jense and Burruss, 1979; Sargent and Forbes, 1973). During construction, effects on small animal populations are predicted to be dispersed and short-term but localized near roads. Traffic effects on small animals during operations are expected to be negligible.

New electric power transmission lines are not expected to impact most wildlife species but may be a hazard to flying birds. Collisions are especially likely for waterfowl when taking off from ponds if lines are close by (Kroodsma, 1978), and for migrating birds when visibility is restricted (Thompson, 1978). Birds of prey, such as eagles, have been electrocuted by smaller transmission lines with short distances between individual lines. However, this is not likely to be a problem with high voltage transmission lines because the individual lines are farther apart (Kroodsma, 1978). Beneficial effects of transmission lines and power poles include their use by some birds of prey for nesting (Stahlecker and Griese, 1979) and as hunting perches (Murphy, pers. comm., 1980).

Radar and microwave emissions produced by surveillance and communications equipment pose potential hazards to some wildlife (Tyler, 1973; Steneck et al., 1980).

Indirect effects of the project, resulting from population growth, are expected to be as large or larger than the direct effects of construction and operation. Population growth would lead to urbanization in some areas (particularly near OBs), and increased visitation to formerly remote and sparsely settled regions. Urbanization would concentrate in valley bottoms near water. These areas contain important habitats for wildlife which have a high potential to be degraded or destroyed. Water requirements of people would require pumping of groundwater which will have the same kinds of effects described earlier in this section.

Urbanization would result in the production of solid and liquid wastes. The impacts of liquid waste production cannot be determined until waste disposal methods are defined. Solid wastes normally are taken to landfills, which attract animals such as gulls, ravens, magpies, skunks, raccoons, house mice, rats, and

certain kinds of snakes (Davidson, et al., 1971; DeBoer et al., 1975). These species increase the likelihood of disease transmission, and the exotic species may displace native species in the adjacent area.

In residential areas native vegetation could be displaced by ornamental and non-native species which normally attract non-native animals (house sparrows and starlings) (Emlen, 1974). People, noise, activity, and deliberate disturbance to animals will cause many native wildlife species to leave or be eliminated. Animals likely to be intolerant of such disturbances include secretive predators (e.g., owls, bobcats, foxes, and badgers) and ungulates (e.g., pronghorn and elk). Coyotes, however, are commonly found in areas of human activity and attempts in this century to decrease their numbers have been unsuccessful (Bekoff, 1977). In the areas near OBs and at construction camp sites, non-native animals, especially dogs and cats, would be brought in with people, and these introduced species often kill or harass native animals (Boggess et al., 1978; Christian, 1974; Denny, 1974; and McNight, 1964).

A second major indirect effect would stem from increased visitation to remote and sparsely settled areas. The large work force would be dispersed over the deployment area in 18 or 19 construction camps. These people would recreate in the area surrounding the valley where they are stationed. The operations personnel and attendant support community would be concentrated at and near the two operating bases and would recreate in nearby areas, mostly within 70 mi (110 km) of the bases. Areas most suitable for recreation are often the most likely to contain concentrations of wildlife.

ORV use is expected to be high among construction workers and to a lesser extent among operations and support people. With expansion of road systems, access to formerly remote areas will be facilitated. ORV use will adversely affect wildlife through noise, soil disturbance, and direct mortality (Bury et al., 1977; Byrne, 1973; Luckenback, 1978; Luckenback and Bury, 1978).

Hunting should have little or no adverse effect on big game animal populations. For these species, the number of permits issued each year currently does not meet the demand. Thus, an increase in demand should not change hunting pressure. However, hunting pressure on other game species should increase in proportion to the increase in the number of people present. Poaching is likely to be a severe problem in most areas. In New Mexico, for example, big game poaching may be as large or greater than the legal harvest (Pursley, 1977). Deer and game birds are the animals most likely to be shot.

Effects on Selected Species. Important species of birds of prey include golden eagle, ferruginous hawk, red-tailed hawk, Swainson's hawk, rough-legged hawk, marsh hawk, prairie falcon, kestrel, Cooper's hawk, turkey vulture, long-eared owl, great horned owl, and burrowing owl. Many of these birds are large, conspicuous, roadside animals, and are preferred targets for poachers. They are also subject to harassment at their nests and to being killed by cars. Certain species are highly sensitive to the project because they nest in the lowland Great Basin in potential deployment areas. These species include the ferruginous hawk and burrowing owl. Both species have declined in numbers in recent years because of human activities. Impacts on birds of prey are being studied.

Two species of rodents, the pale kangaroo mouse (Microdipodops pallidus) and dark kangaroo mouse (M. megacephalus), may be adversely affected by this project because a large part of their range is in those lowland portions of the Great Basin considered suitable for M-X deployment (Burt and Grossenheider, 1976). Other terrestrial wildlife have populations inside and outside the Great Basin leaving large parts of their populations untouched.

Big game animals not previously discussed that may be affected by M-X deployment in Nevada/Utah include mule deer and elk. Figures 4.4.2-1 and 4.4.2-2 show the distributions of mule deer and elk, respectively, and the intersections of their ranges and habitats with project activity. Construction activities could impact mule deer through loss of lower elevation winter and spring range, some of which contains areas of key habitat. Winter key habitat areas are of vital importance to mule deer in that they provide forage and shelter at lower elevations when higher elevation habitats are buried under heavy snow. Without these areas, deer would have a more difficult time surviving in winter. Spring key habitat areas provide forage for the winter-weakened animals in addition to areas where does give birth.

Another impact to mule deer would be the interruption of migration pathways between seasonal ranges, effectively reducing available habitat, some of which may be key habitat. The M-X road network would cross at least some of these pathways, particularly on bajadas and in the mountains. Other project features may interfere with migration routes that cross valleys. During construction of facilities in or across a migration route, deer movements may be interrupted if deer avoid the activity and cannot (or will not) circumvent the area of disturbance (e.g., Bellis and Graves, 1976; Hood and Inglis, 1974). This effect should be short-term (no more than 2 years); after that time they would be able to use the route again (assuming no permanent barrier, such as a fence, were constructed).

Other effects of the M-X road network on mule deer are related to traffic and altered vegetation along roadsides. If deer avoid roads and traffic, then habitat is lost; if they do not, road kills are increased. Noise and visual disturbances have been shown to reduce deer use of habitat adjacent to roads, particularly within 650 feet (200 m) (Rost and Bailey, 1979; Bellis and Graves, 1976). In contrast, where runoff increases forage productivity in areas adjacent to roads, deer may be attracted to these areas (Carbough, et al., 1975; Puglisi, et al., 1974). For operations, road effects would occur primarily in the vicinity of the OBs. Increased traffic in the mountain areas within the study area resulting from induced population growth could kill more deer than construction-related road kills in the deployment area; more deer are present in these mountain areas, and roads intersect more deer range and migration routes.

Elk are less likely to be affected directly by the project because they live in the mountains. However, construction and operation of roads and communication systems in the mountains may affect them through habitat loss or disturbance. Elk have been shown to avoid roads for a distance of about 650 ft (200 m), and avoidance is related to volume of traffic (Rost and Bailey, 1979; Lyon and Jensen, 1980; Schultz and Bailey, 1978). Such effects are particularly strong where recreational activities, particularly hunting, occur (Schultz and Bailey, 1978).

The exclusion of elk from water sites is possible, as recreation is likely to concentrate in places with surface water, and such effects are strongest where

hunting occurs (Geist, 1971). Recreational uses such as camping and backpacking in elk summer range may cause the animals to move to less favorable habitat (Boyd, 1978), thus reducing survival. Elk, however, are found in only a few locations within the potential deployment area in Nevada and Utah.

Of the upland game birds in the study area, most species generally do not frequent valleys, except for Gambel's quail and Chukar's partridge in winter. Impacts to these species are expected to be minimal.

Waterfowl in the Nevada/Utah area, where they are a significant regional resource, are not expected to be significantly impacted by M-X. Abundance estimates of 50,000 or fewer in the DDA (compared to over one million in the Texas/New Mexico study area) are concentrated in national and state wildlife refuges in the White River System (Pahranagat National Wildlife Refuge, Key-Pittman and Wayne Kirsch Wildlife Management Areas (see Figure 4.4.2-3)), with larger numbers outside the DDA in Ruby Valley, Carson Sink, Overton, and Lahontan Valley. Major waterfowl habitats are considered geotechnically unsuitable. Where habitats, as broadly defined by state agencies (including seasonally marshy areas around playas), overlap project areas, the maximum proportion of habitat lost in a hydrologic subunit is 8 percent, and in most cases is 1 to 2 percent or less. Effects from water drawdown are difficult to evaluate but would probably not be significant for the larger habitats. Monitor Valley habitats are fed by mountain runoff. White River, Pahroc, and Pahranagat Valley habitats depend on springs, but in these valleys, M-X water use is 10 percent or less of total perennial yield, so significant drawdown is unlikely. Smaller habitats which might be affected by drawdown support only small numbers of waterfowl. Indirect effects are also not likely to be significant, as waterfowl hunting is state regulated based on bird population estimates, not hunter demand, and the large waterfowl concentrations are in national and state refuges. Poaching is difficult to estimate, but effects probably would not be significant for the DDA.

Two species of fur-bearing animals of special concern are the kit fox and bobcat. The kit fox, like the pronghorn and sage grouse, is sensitive because all of its preferred habitat is in lowlands where M-X would be sited (McGrew, 1979). Egoscue (1956, 1962) believes that kit foxes are not very wary of man and, as a result, many are killed each year by trapping, poisoning, and shooting. There are numerous accounts of foxes existing within city limits (Jensen, 1972), close to roads and occupied buildings (Egoscue, 1956, 1962), or in fields and levees adjacent to irrigated cropland (Swick, 1973; Morrell, 1975). Morrell (1975) indicates that this interaction should be considered marginal. Allison (1970) recommends that leaving an island or knoll of native vegetation covering 40 acres at various points should provide food and habitat for kit foxes. Impacts of clusters in valleys should be small once they are built, although kit foxes may be forced away from men and machinery during construction.

Bobcats are found throughout Nevada around most mountain ranges (Molini, 1980). Riparian zones near streams and marshes may contain larger numbers of bobcats than the surrounding drier areas (Ashman, 1979). Bobcats are secretive, nocturnal animals and may leave areas with large concentrations of humans. Most impact will not come from the direct construction of the M-X because this will occur in valleys where bobcats are in lower numbers. The pelts of bobcats are valuable, selling for $314 each in 1979, and trapping pressure is expected to increase with the human population increase (Molini, 1980).

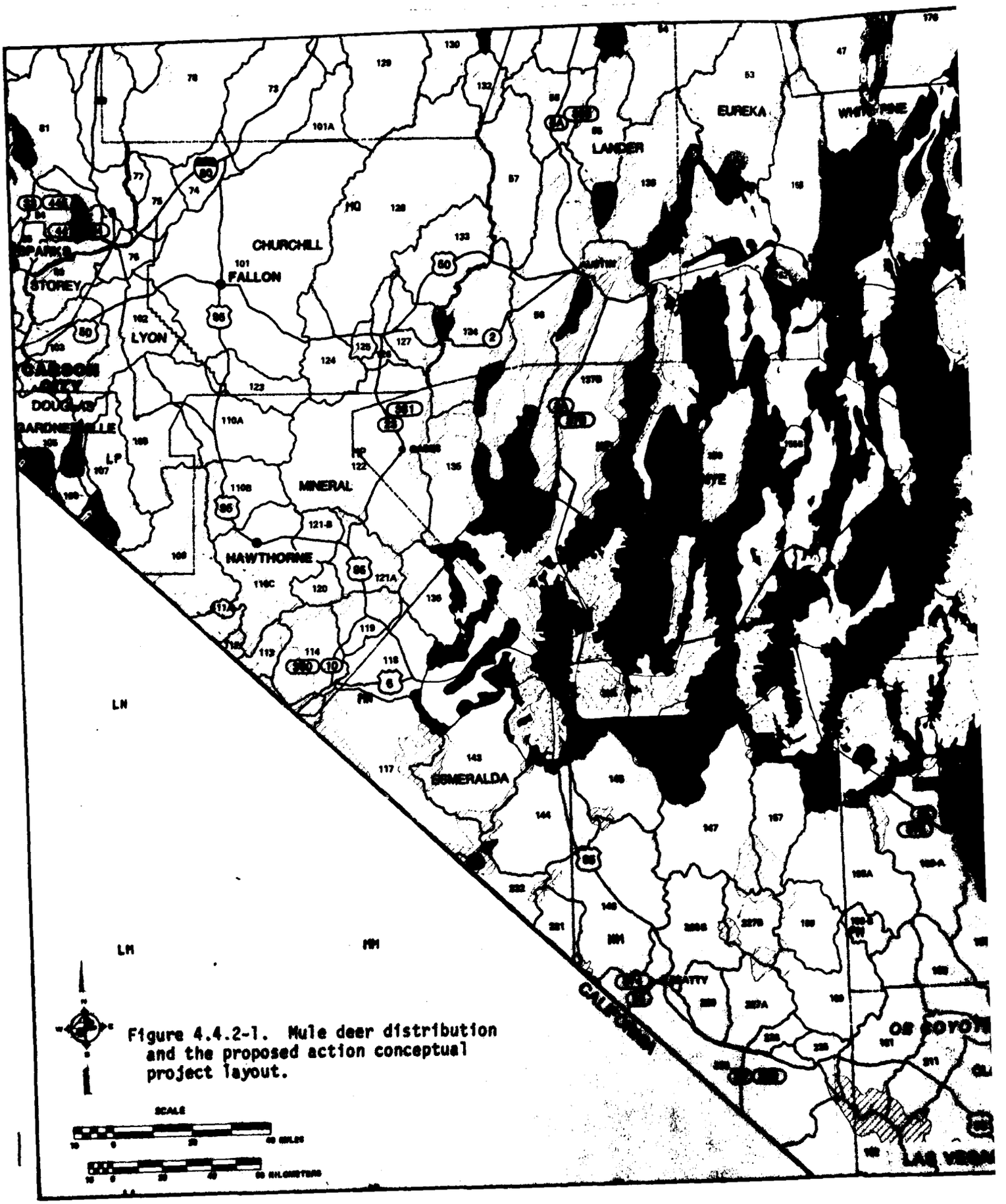
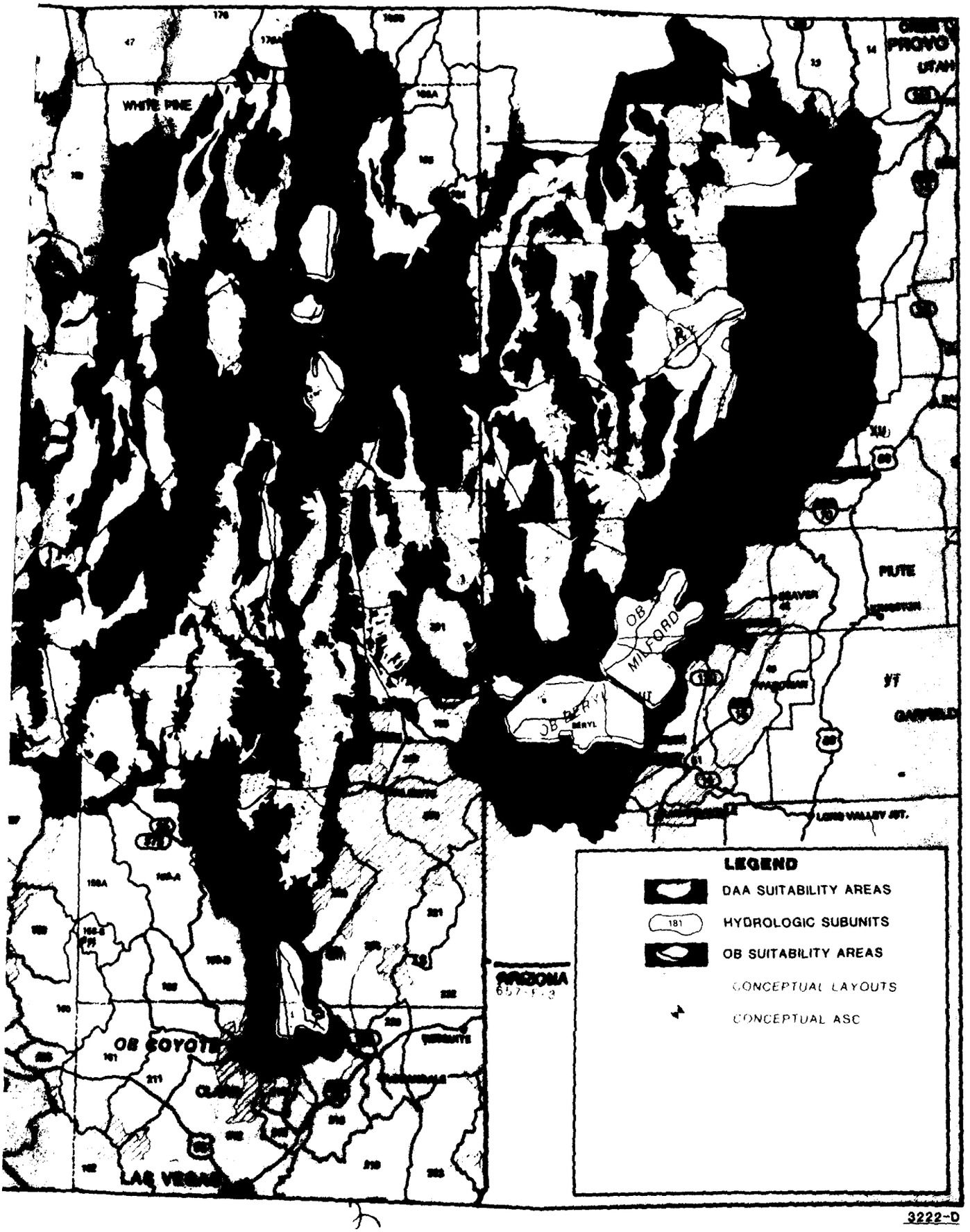
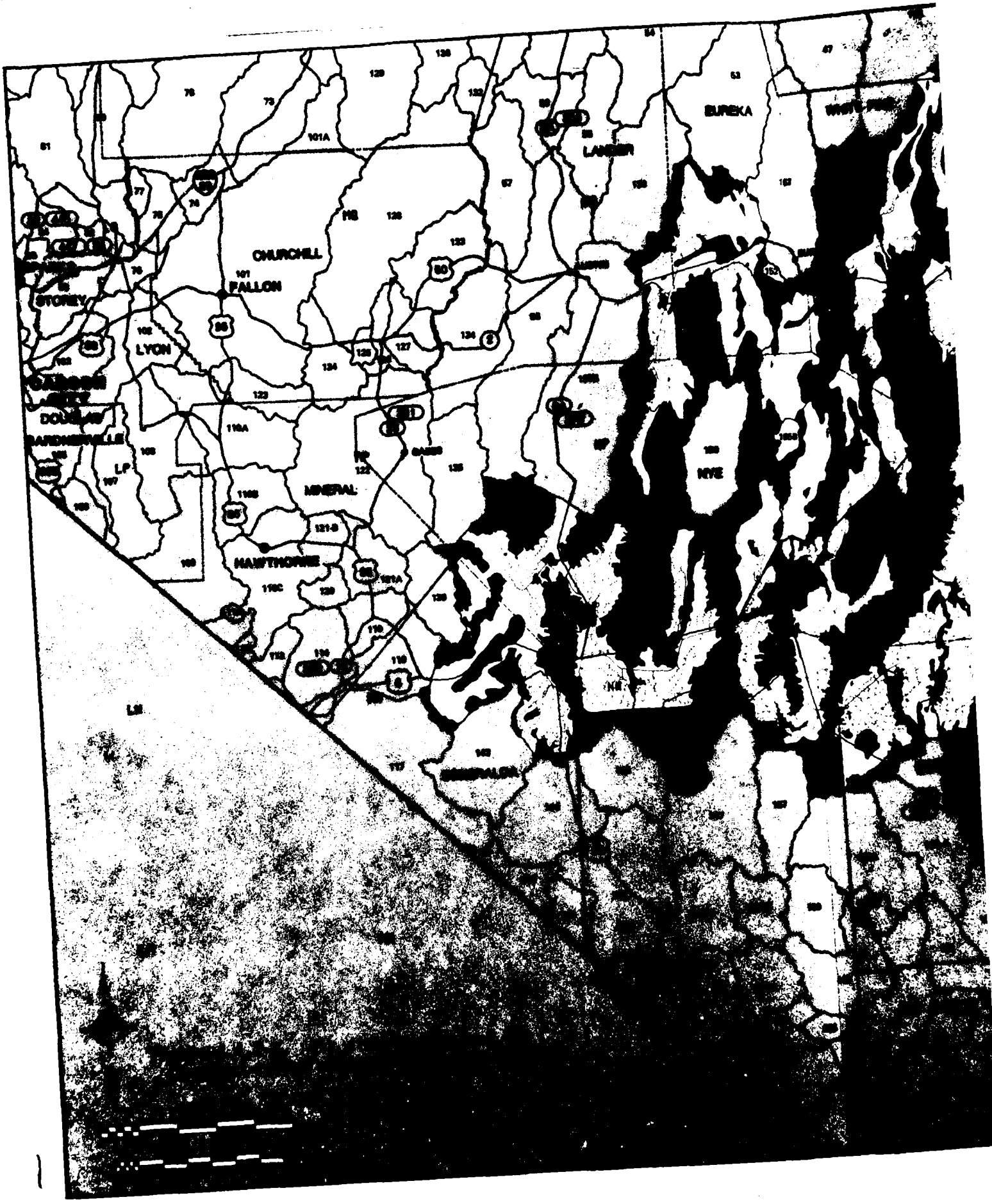
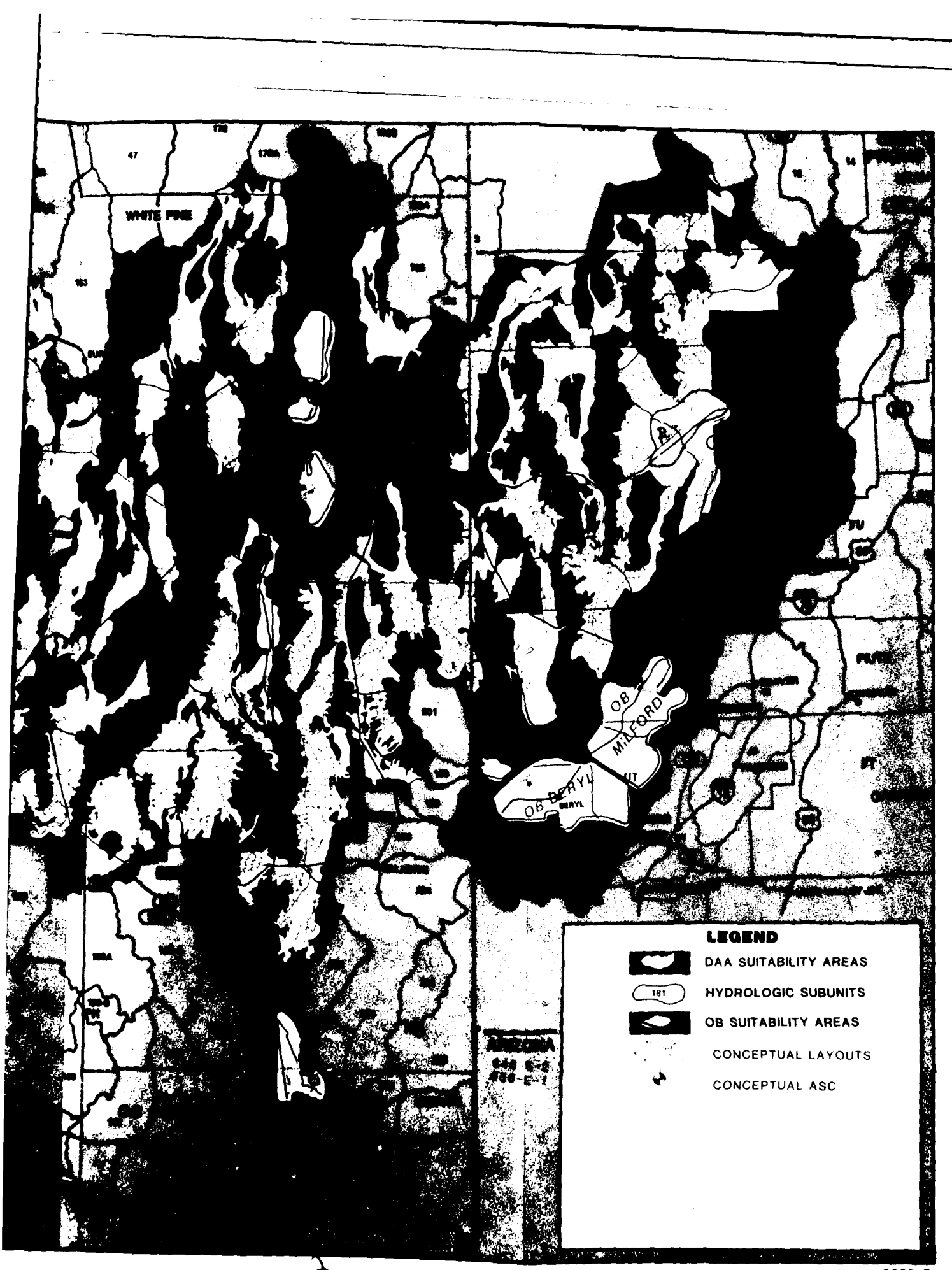


Figure 4.4.2-1. Mule deer distribution and the proposed action conceptual project layout.


WHITE PINE
PIUTE
OB MILFORD
OB BERYL
BERYL
OB COYOTE
LAS VEGAS
LEGEND
DAA SUITABILITY AREAS
181
HYDROLOGIC SUBUNITS
OB SUITABILITY AREAS
CONCEPTUAL LAYOUTS
CONCEPTUAL ASC

3222-D


EUREKA
LANDER
CHURCHILL
FALLON
STOREY
LYON
DOUGLAS
MINERAL
HAWTHORNE
NYE


WHITE PINE
OB
MILFORD
OB
BERYL
BERYL
LEGEND
DAA SUITABILITY AREAS
181
HYDROLOGIC SUBUNITS
OB SUITABILITY AREAS
CONCEPTUAL LAYOUTS
CONCEPTUAL ASC

3222-D

Texas/New Mexico Regional Impacts

Effects Common to Many Species. Impacts arising directly from project construction and operation would be habitat loss, vehicle collisions with animals, and establishment of transmission lines. Wildlife habitat loss would result from construction of shelters, roads, construction camps, and gravel pits. Small animals such as snakes, lizards, and rodents, whose entire home range may be within a single cleared area, are likely to perish. Removal of natural vegetation initially would reduce or eliminate carrying capacity for small and large herbivores. Carnivores would be reduced in number through removal of foraging and breeding areas, and through reduction of prey density. However, effective revegetation could restore or even enhance the habitat (USFWS, 1978).

Groundwater use is expected to have little direct impact on terrestrial wildlife, since none of the existing aquatic habitats depend upon groundwater for recharge. In some cases, redirected water runoff from construction projects may supplement existing surface water habitat. Supplementation of surface water by nonpolluted runoff could have a positive, temporary impact on waterfowl, certain amphibians, pheasant, and other species dependent upon local surface water supply. Degradation of surface water quality could result from uncontrolled construction-related runoff and could have a negative impact on those same species.

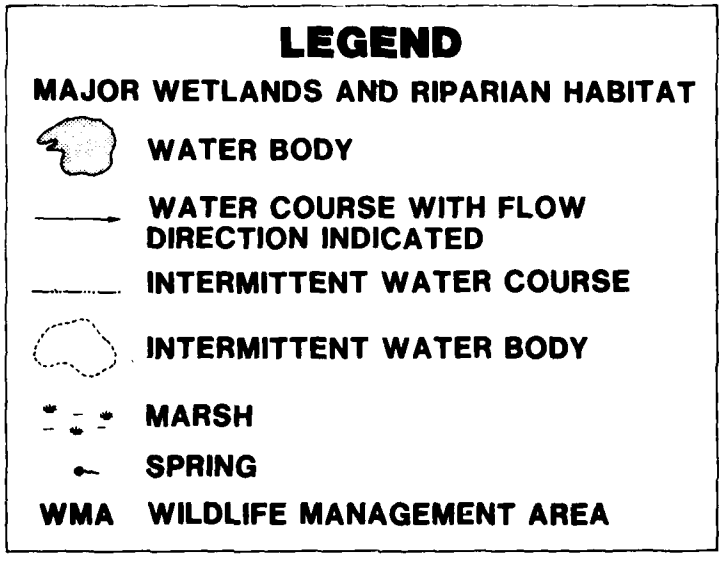
Increases in vehicle traffic will lead to increases in highway deaths of many kinds of animals (Schultz and Bailey, 1978). Nocturnal animals, including snakes, rodents, owls, skunks, and rabbits, will be especially vulnerable (McQuivey, 1978; Sargent & Forbes, 1973). Highway mortality can represent an important fraction of total mortality in the vicinity of roads. The effect may be especially noticable on game species such as deer. Should there be a significant number of road deaths, an increase in crows, vultures, hawks, and coyotes may occur around roads, subjecting them to similar hazards.

Roads and roadsides concentrate food for carnivores, and these species will be attracted to roads, which may result in increased mortality. Vegetation along roads differs from that of the surrounding area, and the abundance and diversity of both plants and animals should change as roads are constructed. This expected change is currently under investigation in the Nevada/Utah study area.

Noises from vehicles, machines, air traffic, and explosions will most strongly affect animals with large territories. Such animals will tend to retreat from the noise source (Rost and Bailey, 1979). Big game animals, large mammalian carnivores, and birds of prey are examples of those likely to be affected. These animals will respond to noise by deserting the area for the duration of the activity (Lyon, 1979).

Electric power transmission lines are hazardous to flying birds (Willard, 1978). Transmission lines and poles also provide hunting perches for hawks and eagles which could be of considerable importance in extending their range and activity in this largely treeless region (Stahlecker and Griese, 1979).

Indirect effects, primarily population growth, can be as large or larger than the direct construction and operation effects. Increased urbanization would result in production of solid and liquid wastes that will require treatment or disposal.


LEGEND
MAJOR WETLANDS AND RIPARIAN HABITAT
WATER BODY
WATER COURSE WITH FLOW DIRECTION INDICATED
INTERMITTENT WATER COURSE
INTERMITTENT WATER BODY
MARSH
SPRING
WMA
WILDLIFE MANAGEMENT AREA

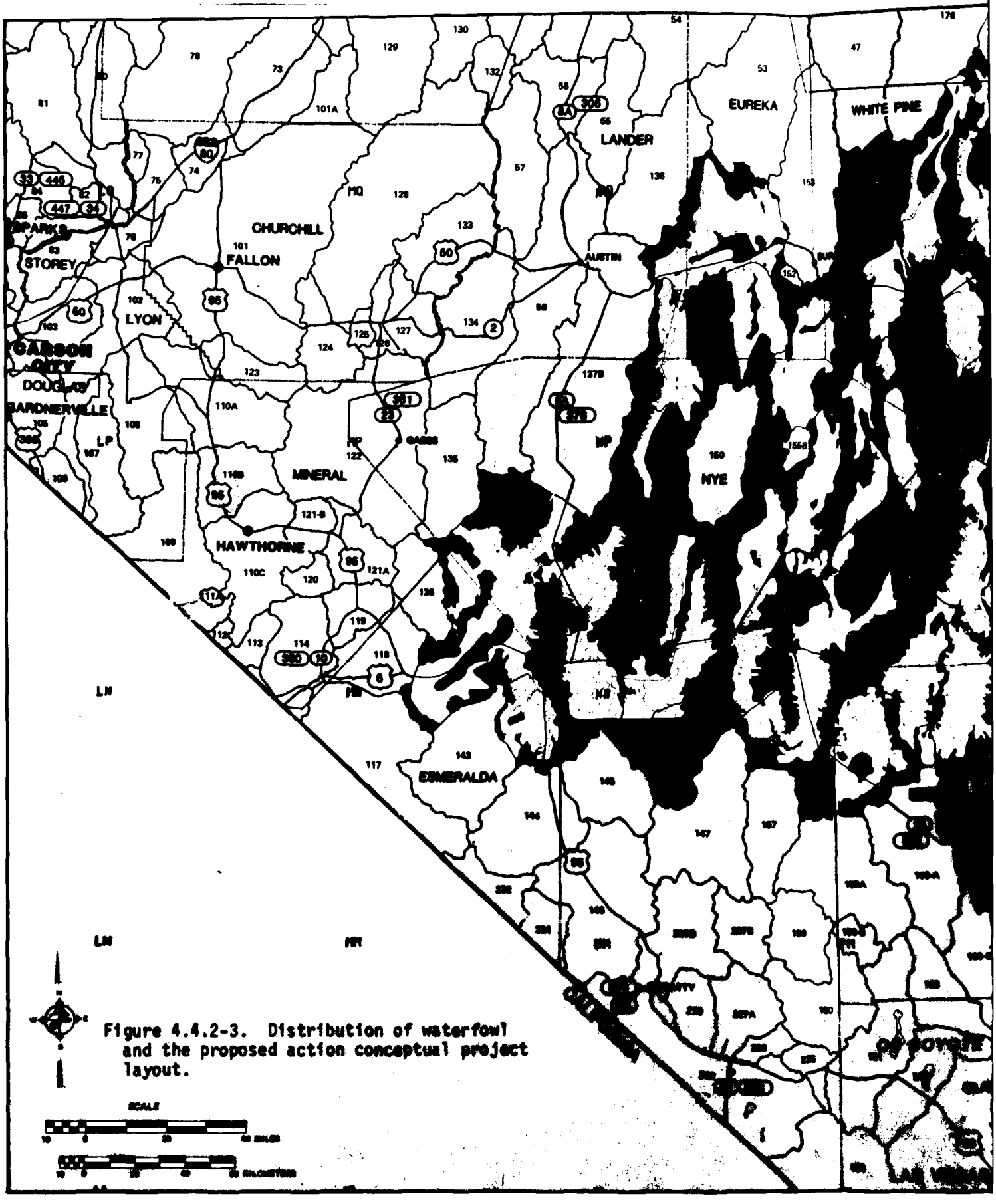
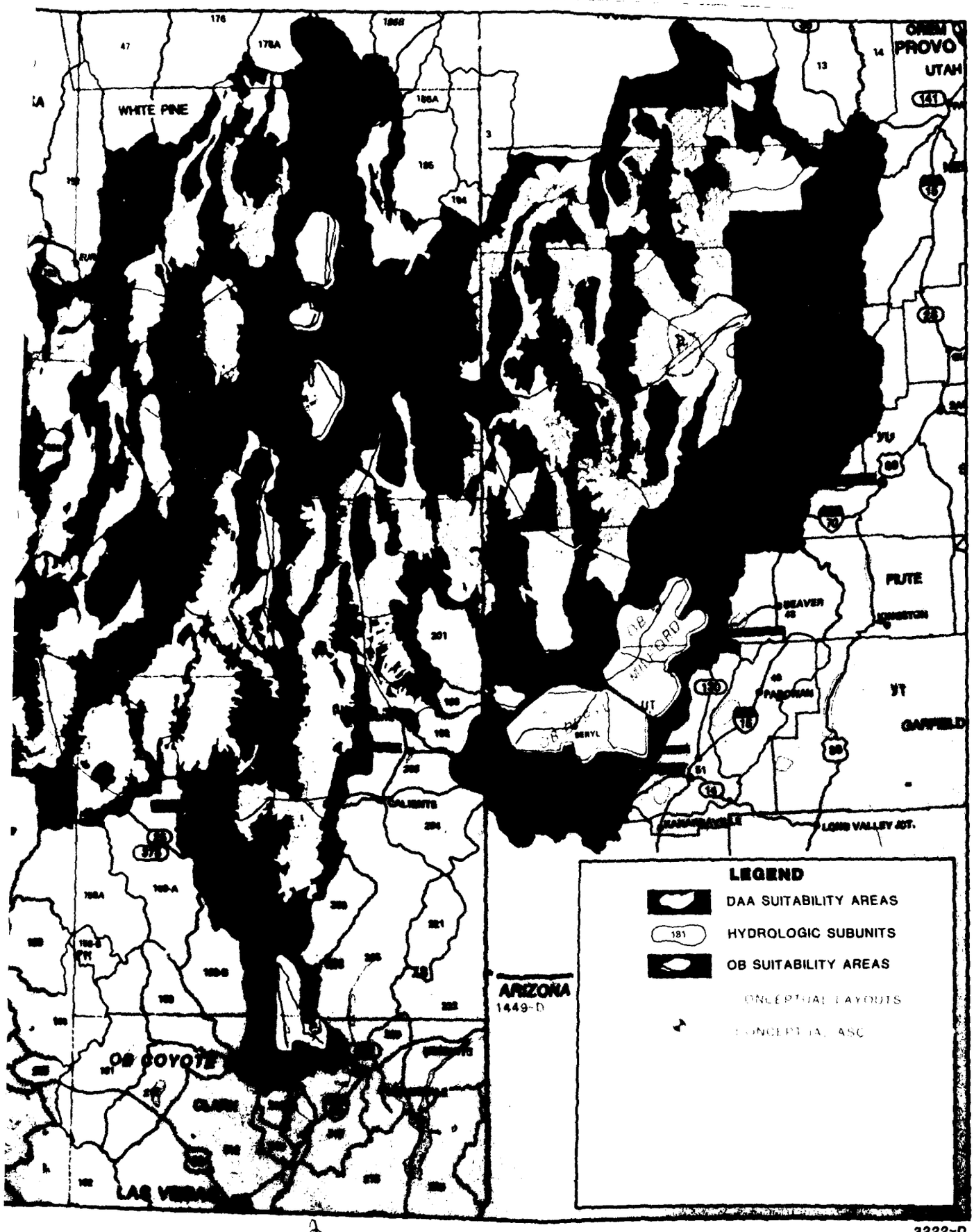


Figure 4.4.2-3. Distribution of waterfowl and the proposed action conceptual project layout.


WHITE PINE
OREM
PROVO
UTAH
PIUTE
BEAVER
GARFIELD
ARIZONA
1449-D
OB COYOTE
LAS VEGAS
LEGEND
DAA SUITABILITY AREAS
181
HYDROLOGIC SUBUNITS
OB SUITABILITY AREAS
CONCEPTUAL LAYOUTS
CONCEPTUAL ASC

3222-D

Impacts of liquid waste production cannot be determined until the waste disposal method is defined. Solid wastes are normally taken to landfills and should attract animals such as ravens, crows, skunks, raccoons, house mice, rates, and certain kinds of snakes (Davidson et al., 1971; De Boer et al., 1974). Some of the exotic species may displace natives.

Residential vegetation could provide food and resting places for warblers and other migratory songbirds. Concentrations of people and attendant increased noise, activity, and deliberate disturbance to animals would cause many species to leave or be eliminated from some areas of remaining natural habitat. These effects would be strongest on predators such as hawks, owls, bobcats, foxes, and badgers. Coyotes, however, are likely to maintain or increase their number, a result viewed as a negative impact by regional stockmen (Sanyal, 1975). Feral dogs and cats may be introduced, increasing both competition with native predators and predation on prey species (Boggess et al., 1978; Christian, 1974).

The large work force necessary for constructing the M-X facilities would be dispersed over the deployment area in construction camps. When not working, these people would engage in outdoor recreation in the vicinity of their stations. Recreation activities most likely to adversely affect wildlife include hunting and ORV use. These activities are most likely to occur in the nearby mountain and riparian areas such as the Canadian Breaks and valleys of the Brazos and Pecos rivers and Palo Duro Canyon. The areas most suitable for recreation are also the most likely to contain wildlife concentrations. Hunting, if in accordance with state regulations, should have little adverse effect on game animal populations. Poaching, however, is likely to be a severe problem in most areas. Deer, barbary sheep, upland game birds, and waterfowl are the most likely animals to be shot. ORV use is expected to be high among construction workers, and access will be facilitated by construction activities. ORV use has been shown to be detrimental to wildlife and habitat through vegetation removal and soil disturbance (Sheridan, 1979). Dogs and cats brought in with the construction crews can seriously impact native animals (Denny, 1974; Christian, 1974; Iverson, 1978). Increases in vehicle traffic associated with recreation will increase the number of animals killed by vehicles. Because most of the land in Texas is in private ownership, recreational impacts are likely to be relatively more concentrated on the public lands in New Mexico.

Effects on Selected Species. Birds of prey liable to be affected include Swainson's hawk, marsh hawk, prairie falcon, turkey vulture, kestrel, short-eared owl, great horned owl, and barn owl. They are preferred targets for poachers. They are also subject to harrassment at their nests and to being killed by cars. Certain species (e.g., marsh hawks and short-eared owls) are expected to be impacted by to the project because they nest in the shortgrass habitat type in precisely those areas where M-X may be installed. Impacts of the M-X project on birds of prey are being studied.

All big game species of the region could be impacted. Direct effects will primarily affect pronghorn (as discussed above) and mule deer. Both are successful in areas of mixed native and agricultural vegetation (Cole and Wilkins, 1958). Loss of natural vegetation will reduce the quality of the habitat. Because space for game herds is limited, displacement could cause some population declines of mule deer in the deployment area proper. Road kills of mule deer could increase, while noise and traffic could reduce deer use (Rost and Bailey, 1979). Where runoff increases forage

productivity and along road edges, deer may be attracted and be exposed to traffic hazards (Carbaugh et al., 1975). M-X deployment in this area, however, is not expected to have significant direct impacts on mule deer for the following reasons.

Little of the mule deer range would be used for deployment. Only 35 clusters or part of clusters would be in deer habitat, and these are concentrated in Chaves, Roosevelt, and de Baca counties, New Mexico. The Dalhart OB would be at the edge of deer range on the north side of the Canadian Breaks, but is located in farmland. The Clovis OB would be far from deer range.

In areas where deployment would overlap range, mule deer are not likely to be found directly on-site, as they prefer broken topography with at least some woody cover, land which is unsuitable for clusters and shelters. Thus, even in Chaves County, deployment would necessarily avoid superior deer habitat.

Most mule deer herds are non-migratory, and deployment would be on the edge of deer range, so there should be no project-caused disruption of movement patterns.

Mule deer are very tolerant of human presence and will remain in an area as long as sufficient cover and browse are present.

Similarly, indirect effects are not likely to be detrimental. Herds are managed in both states, and the annual harvest is based on herd yield, not pressure for hunting licenses. In Texas, there is evidence (Teer, 1965) that many mule deer herds are overpopulating their ranges, so additional harvesting would improve herd health. Poaching may be a problem, but it is difficult to quantify and could be of importance only in New Mexico, as the Texas herds are fenced in on private land.

Given these, impacts of M-X on mule deer in Texas/New Mexico are likely to be not significant.

White-tailed deer and barbary sheep are not likely to be directly affected because populations are remote from geotechnically suitable areas. Huntable white-tailed deer herds in the Texas Panhandle are found almost exclusively in the eastern portions of the Canadian Breaks. Barbary sheep (Aoudad) are restricted in Texas to Palo Duro Canyon. In New Mexico, a small population of white-tailed deer is restricted to the southernmost part of the area associated with the Pecos River (Mescalero Sands), and barbary sheep are restricted to mountainous areas. Impacts to these species would result from increased hunting and human presence in their habitats. Because the populations are currently small, poaching or harassment could lead to serious declines in the area.

The lesser prairie chicken is closely related to the sage grouse and is its approximate ecological analogue in the Texas/New Mexico High Plains. The lesser prairie chicken is considered a significant species because it is a native game bird with declining abundance, as a result of habitat loss, throughout its geographic range in Texas, New Mexico, and Oklahoma. In 1978, the harvest was 1,248 birds in New Mexico and 87 in Texas. It is retricted to shortgrass prairie and agricultural land for forage or breeding. Its present distribution reflects this sensitivity to significant habitat alteration. It will use disturbed areas, even oil pads, for leks (strutting grounds), much as sage grouse, but requires shortgrass prairie for brood areas, and seems to seek out shinnery oak scrub for food in winter. M-X project elements

intersect with lesser prairie chicken habitat in Bailey and Cochran counties, Texas, and Chaves, Lea, and Roosevelt counties, New Mexico.

Potential effects of M-X deployment on the lesser prairie chicken fall into two major categories: construction activities and increased human population. Water use is not an issue because M-X demand is expected to be met from the Ogallala aquifer and because the lesser prairie chicken does not need open water. Construction activities of concern include land distrubance, both short- and long-term, and noise, which is short-term. Land disturbance involves habitat temporarily lost during project construction and that permanently lost to emplacement of facilities. Restoration of native vegetation would allow subsequent use of temporarily disturbed areas by prairie chicken. Noise from construction activities is likely to scare off nearby birds, but the behavioral avoidance distance is unknown. If noise is close to leks or brood areas, birds could be induced to abort mating behavior or abandon nests, causing some loss to the population. If appropriate habitat is not available nearby, that year's productivity could be lost for the affected birds. This effect depends upon the proximity of construction activities to leks and brood areas during spring and summer. The general result of short-term habitat loss is population reduction, followed by recovery to a new level that would be determined by the amount and type of habitat permanently lost. Lesser prairie chicken will use the cleared areas for leks, but brood areas are found only in relatively undisturbed shortgrass prairie.

Effects due to increased human population would include possible increased legal and illegal harvest during construction and potential habitat disturbances from ORV recreation. Increased hunting pressure is likely to be small since project-induced population growth is expected to be less than 15 percent of the present population. Effects of increased hunting pressure on this species should be minimal because it is managed as a game bird with limits on harvest set to maintain huntable populations. Illegal harvest is difficult to assess, but could have measurable effects. ORV use is again difficult to quantify, but lesser prairie chicken habitat includes sandhills and shinnery oak scrub, which now attract ORV users in New Mexico, so there is potential for habitat disturbance from this source.

Some leks and especially potential brood areas will be irretrievably lost to M-X project elements, but how much this will depress the population from baseline levels cannot be estimated at present. Tier 2 environmental analysis will identify the potential site specific impacts associated with leks and brood areas. New leks and brood areas can be established if old ones are lost, provided suitable habitat is available. Loss of some habitat is unavoidable, due to the necessity to site project elements within the range of the species if siting in Texas/New Mexico is selected. Information developed during Tier 2 environmental analyses on the location of leks, brood areas, and wintering areas would allow more careful siting of project elements to avoid these critical habitats, and will be gathered if Texas/New Mexico is selected.

The current conceptual layout intersects lesser prairie chicken range in Bailey and Cochran counties, Texas and Chaves, Lea, and Roosevelt counties in New Mexico. Intersections with this potential habitat are 1 percent or less in all but Bailey County, Texas (14 percent) and Roosevelt County, New Mexico (2 percent). Since mapped range contains significant amounts of land where the species do not occur these figures represent overestimates of habitat lost even assuming no

mitigation by avoidance. Thus habitat loss for this species is expected to range from small to minimal.

Neither operating base, Clovis nor Dalhart is in or near lesser prairie chicken range, so no effects from construction of these bases are expected. In Texas/New Mexico, split basing impacts would be comparable to those addressed for full basing (Alternative 7) since the same lesser prairie chicken use areas are involved in both alternatives. One difference occurs in Roosevelt County where there are four fewer clusters. This reduces long-term impacts in this county.

There are no lesser prairie chicken in the Nevada/Utah deployment areas.

Mitigation of permanent habitat loss due to project elements is difficult. The severity of habitat loss, however, depends strongly on knowledge of lek and brood area locations. When these are known, onsite avoidance will result in far less impact on the populations than otherwise. Temporary effects due to construction are more mitigable. Minimizing temporarily disturbed area results in smaller short-term habitat loss. Restoration of this area to shortgrass prairie after completion of construction should allow some recovery of the prairie chicken population. Construction timetables resulting in only small portions of the range being used at any one time would allow displaced birds to move to completed areas, rather than forcing them out of the area altogether. When brood areas and leks are known, construction would be scheduled in or near these areas in late summer, fall, or winter to minimize disturbing the reproductive cycle.

Upland gamebird populations in the area will be impacted by changing habitat. Filling-in of playa lakes could reduce habitat critical for pheasant reproduction (Bolen et al., 1979). Reduced agriculture could negatively impact bobwhite quail, but would probably have a reciprocal effect on scaled quail and lesser prairie chickens if the areas were returned to natural vegetation. Habitat reduction, resulting from roads and structures, would negatively affect all upland game. Increased hunting pressure and human presence in the habitat would be the primary indirect impacts.

The Texas/New Mexico High Plains playa lakes are wintering areas for over one million ducks and geese and provide resting places for a comparable number of waterfowl migrating on the Central Flyway. These playa lakes are concentrated in the central and western portions of the Texas Panhandle and easternmost part of New Mexico (Figure 4.4.2-4). Playa lakes are upland features scattered throughout the DDA, but tend to be concentrated in Hartley (eastern portion), Deaf Smith, Randall, Parmer, Castro, Bailey, and Lamb counties, Texas, where they number in the tens of thousands, providing resting and feeding areas for waterfowl. Of the four most abundant species, mallard, pigeon, green-winged teal, and pintail, green-winged teal require their food plants to be in water; the others can feed in grain fields and uplands as well (Bellrose, 1976).

There are two M-X-related actions which could adversely affect waterfowl and their essential habitat: construction of clusters and DTN, with ancillary effects; and population in-migration. Most of the playa lakes are intermittent and shallow, and the smaller ones are distributed ubiquitously, making avoidance difficult. It is expected that a number of smaller playa lakes will be lost due to construction, but this cannot be determined before large-scale site layouts are

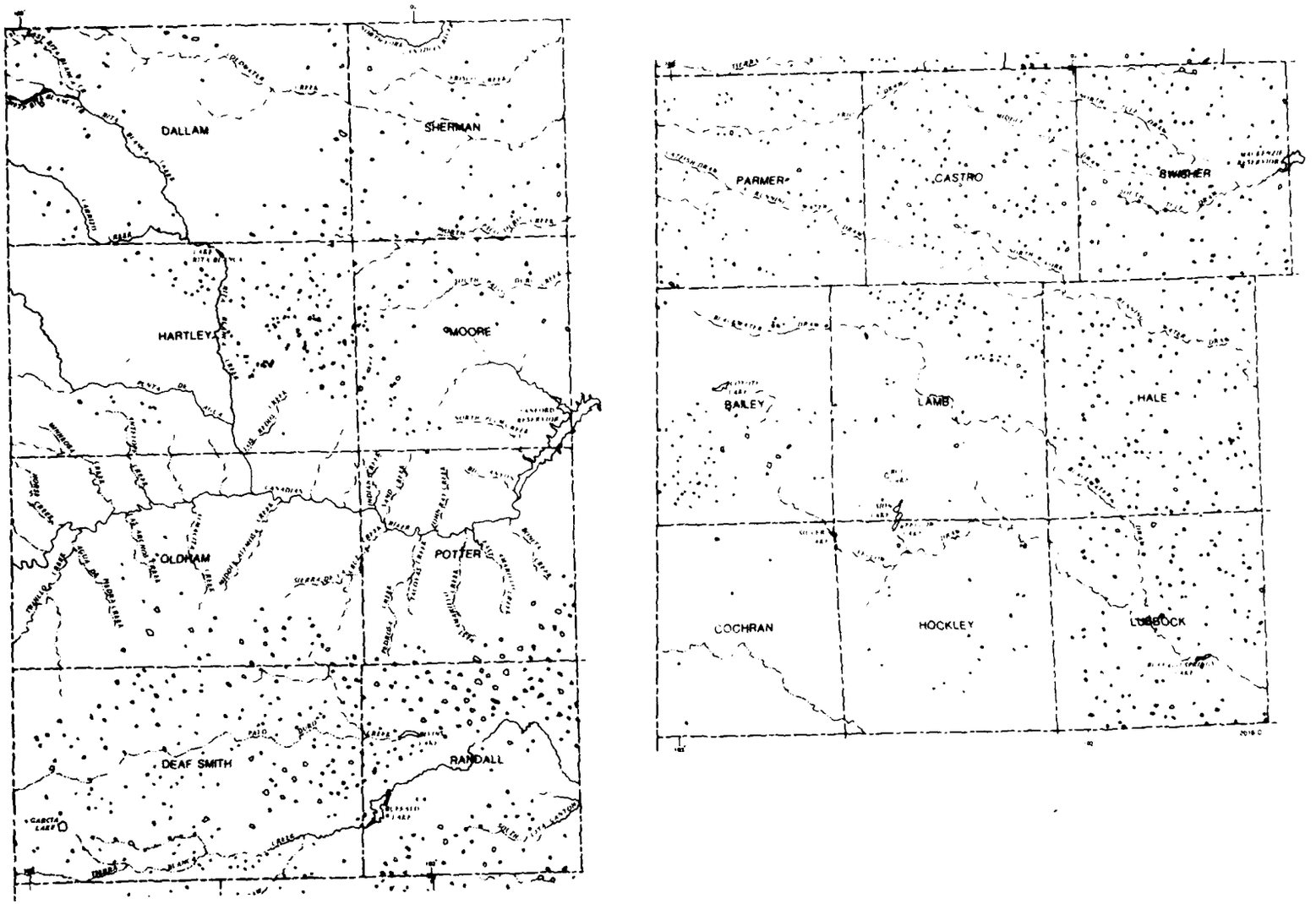


Figure 4.4.2-4. Distribution of the larger playa lakes in the Texas High Plains.

available. Use of section roads for DTN and cluster roads, however, reduces the potential impact considerably below that expected if all roads were to be newly constructed. Because playa lakes are undrained internal catchment basins, spilled pollutants associated with construction, such as gasoline, oil, and cement dust, would enter the lakes and accumulate over the construction period, altering water chemistry and perhaps adding toxins adversely affecting invertebrates and plants used as waterfowl food. Noise from construction activities is likely to cause movement away from the immediate vicinity, but this disturbance should be minor, especially if there are other ponds nearby. The second M-X-related action is the influx of project-related personnel. The present scenario envisions construction camps providing both materials and housing in areas presently unoccupied, bringing people in constant contact with areas formerly disturbed only by agriculutral practices. The major personnel-generated actions, hunting and disturbance due to ORVs and other recreational activities, are not likely to have a major effect, as waterfowl hunting is regulated and almost all the land where the playa lakes occur is privately owned. Thus, the major effects of M-X on waterfowl will be due to habitat removal by construction and potential irreversible pollution.

The overall effect would be at a maximum at the end of the construction period, when total land disturbed would peak. Thus, any loss of productivity should be manifest at this time. This loss will be long-term, as it is linked to irreversible habitat loss. No significant short-term effects above and beyond the long-term effects are expected. Compared with existing conditions, the expected effect is a reduction in wintering waterfowl population size. The size of this, however, is problematical, due to lack of knowledge of the level of potential pollution from spilled construction and construction-related materials and its effect on a closed aquatic system. Data on food and space requirements of migrating and wintering waterfowl are lacking, virtually all research having been done on breeding grounds (Bellrose, 1976) which are primarily in prairie potholes in the northcentral U.S. and Canada. Consequently, even if the area of habitat loss were known, the effect would still not be quantifiable.

Of the counties where waterfowl are most abundant, full Texas/New Mexico basing (Alternative 7) has potential for significant impacts in Bailey, Castro, Dallam, Deaf Smith, Hartley, Oldham, Parmer, Randall, and Sherman counties, Texas; and Chaves, Curry, Quay, and Roosevelt counties, New Mexico. These potential impacts will be further evaluated in Tier 2 environmental analyses should siting in Texas/New Mexico be selected. Split basing (Alternative 8), compared to Alternative 7, reduces impacts to waterfowl by avoiding most areas having significant waterfowl concentrations. Potential for significant impacts remain, however, in Deaf Smith and Hartley counties, Texas (at reduced levels) and in Chaves and Roosevelt counties, New Mexico. Effects associated with OBs at Clovis and Dalhart are expected to be minimal due to existing disturbance and paucity of waterfowl habitat in the OB vicinities.

Any irretrievable loss would be due to construction of M-X elements using part or all of playa lake basings, which is likely to be only a small percentage of the total playa lake area. As the present construction scenario envisions land disturbance at the minimum level, with use of section roads wherever possible, the actual loss due to disturbance would seem fixed. As concerns potential pollution, spill containment techniques associated with good construction practices would minimize movement of spilled materials. Pollutants would be most likely to affect the larger playa

lakes, but system requirements call for these to be avoided, thus minimizing potential effects on waterfowl.

Furbearing animals of special concern are the muskrat, swift fox, beaver, bobcat, and badger. The swift fox and badger are sensitive because all of their preferred habitat is in areas where M-X may be sited. The swift fox is near extinction throughout its range and its reduced numbers have resulted in efforts to control predators such as coyotes. Bobcats prefer riparian and scrub habitats, regions where recreation will probably be concentrated. Because bobcats only tolerate limited human presence, they will withdraw from these areas and, thus, lose part of their hunting grounds. The pelts of bobcats are valuable, currently selling for approximately $350, and trapping pressure is expected to increase with the increase in human population. Small beaver and muskrat populations are found in the New Mexico river drainages of the study area. Increased recreational use of the habitats, trapping, and poaching could prove detrimental to those species.

Operating Base I Impacts

Beryl

Mule deer in the western part of Utah occur in low numbers, and human/deer encounters may be infrequent. Deer which roam the area will probably avoid roads (see Ely OB site discussion).

The transplanted elk herd on Indian Peak in the Needle Range northwest of the candidate base site (Figure 4.4.2-5) may also be affected by recreation, as described for the Ely candidate OB site. Several dirt roads lead up to this area from Pine Valley and may be used by people seeking mountains for recreation.

Coyote Spring

Mule deer, which occur in low members in this area, could be affected by increased recreation, but overall impacts to deer would not be very high. The chuckwalla (Sauromalus obesus) which is declining over much of its range may be particularly impacted. This species may reach its northernmost range limit here and construction in this valley and adjacent Kane Springs Valley (particularly on rocky slopes) could destroy chuckwalla habitat and individuals.

Gambel's quail occur throughout the lower elevations, and some loss of habitat would result. Areas which need to be protected from destruction are the newly constructed watering devices (guzzlers) in Kane Springs Wash.

Delta

Increased recreation activity in the Drum and Little Drum mountains to the north, House Range to the west, and the Cricket Mountains to the south of this site would negatively affect mule deer. There probably would be greater demand for hunting in these mountains since they are relatively close to this base site.

Ely

Elk and mule deer in the surrounding mountains may move from their preferred range as a result of increased recreation by backpackers, hikers and

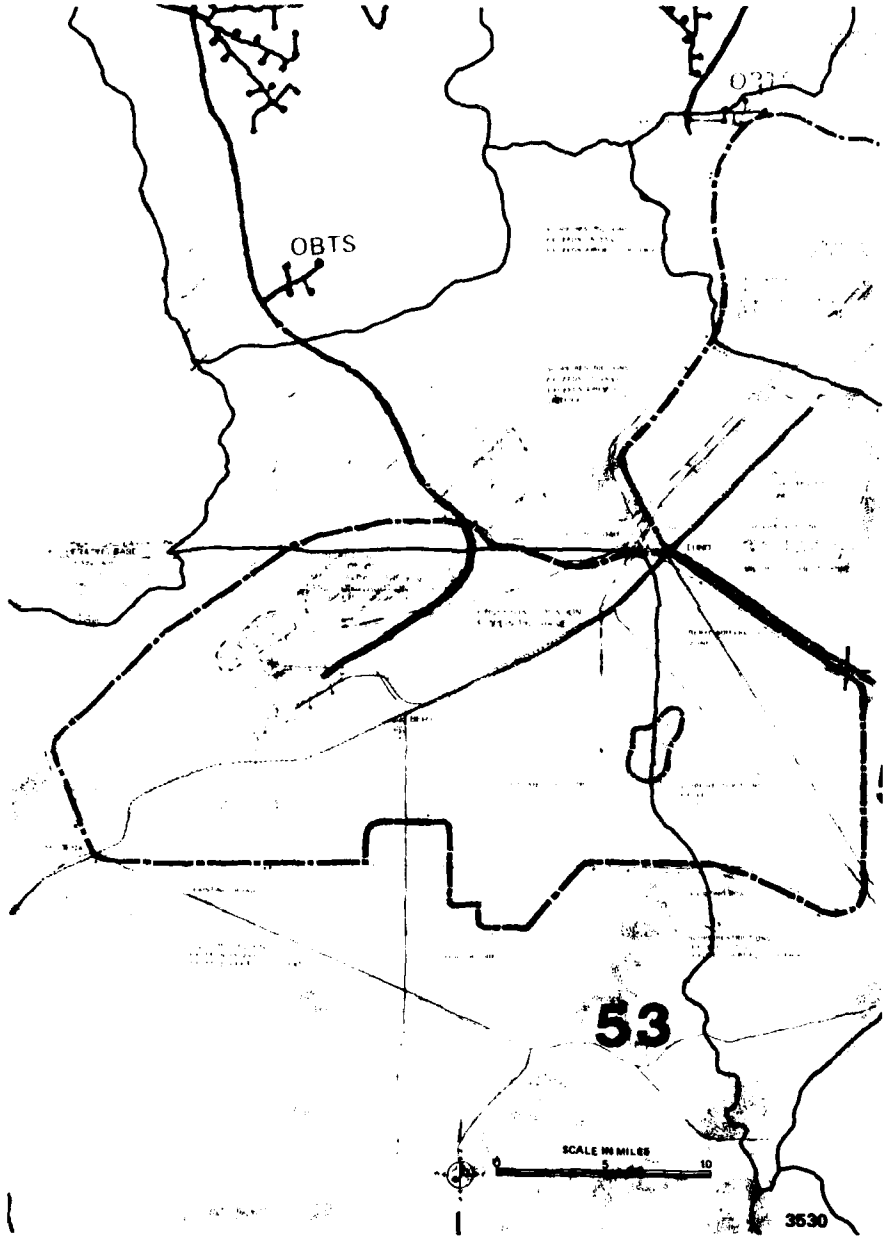


Figure 4.4.2-5. Elk range (green) in the vicinity of the Beryl OB suitability area.

campers. Construction of roads would dissect the mule deer range but is not expected to significantly effect mule deer movements. Present OB location in the suitability area would not cause any loss of elk habitat (Figure 4.4.2-6), but some key habitat is present in the eastern portion and oculd be affected if the OB location were shifted within the suitability area. Poaching may increase for both species.

Milford

Because of their low density in this part of Utah, mule deer and not expected to be greatly affected. Some poaching may occur in areas of higher mule deer densities in the mountains to the south and east of the site.

Elk would not be directly affected by this OB site (Figure 4.4.2-7) but recreation activities of the increased human population could impact the elk herd in the Needles Range as discussed for the Ely OB.

Clovis

No direct impacts to mule deer would be expected from base operations since the current level of disturbance in the area is high. However, the increased human population may result in significantly heavier use of nearby public lands for recreation. Increased hunting and use of ORVs would affect game animal populations and habitat.

Urban expansion of Clovis would directly impact a small number of playa lakes and associated upland game species, which are widely distributed in the surrounding agricultural lands. The agricutural area lost from urbanization would be small. The nearest important animal populations are in Grulla National Wildlife Refuge 20 mi to the south.

Dalhart

The proposed operating base would occupy primarily agricultural cropland, which would reduce wildlife abundance and diversity, particularly for upland game species associated with farmland. Operations are not expected to have direct impacts on mule deer, although cropland will be lost. Indirect impacts due to local population increase can be expected, particularly from increased recreational uses. The Canadian Breaks, which offers game animal populations for hunting, permanent aquatic habitats with edible fishes and highly dissected topography attractive for off-road vehicle recreational use, is likely to be indirectly impacted.

Construction and operation of the new support community would impact upland game in the agricultural land and other wildlife in the stream valley by habitat destruction. Disturbance from construction would tend to drive larger animals southward into the Canadian Breaks.

Effects on Other Protected Species

There is a significant potential for direct and indirect project impacts upon protected and recommended protected species. Federally protected species require consultations (Section 7 Endangered Species Act) with the U.S. Fish and Wildlife Service in order to determine the possible effects on those species. This consulta-

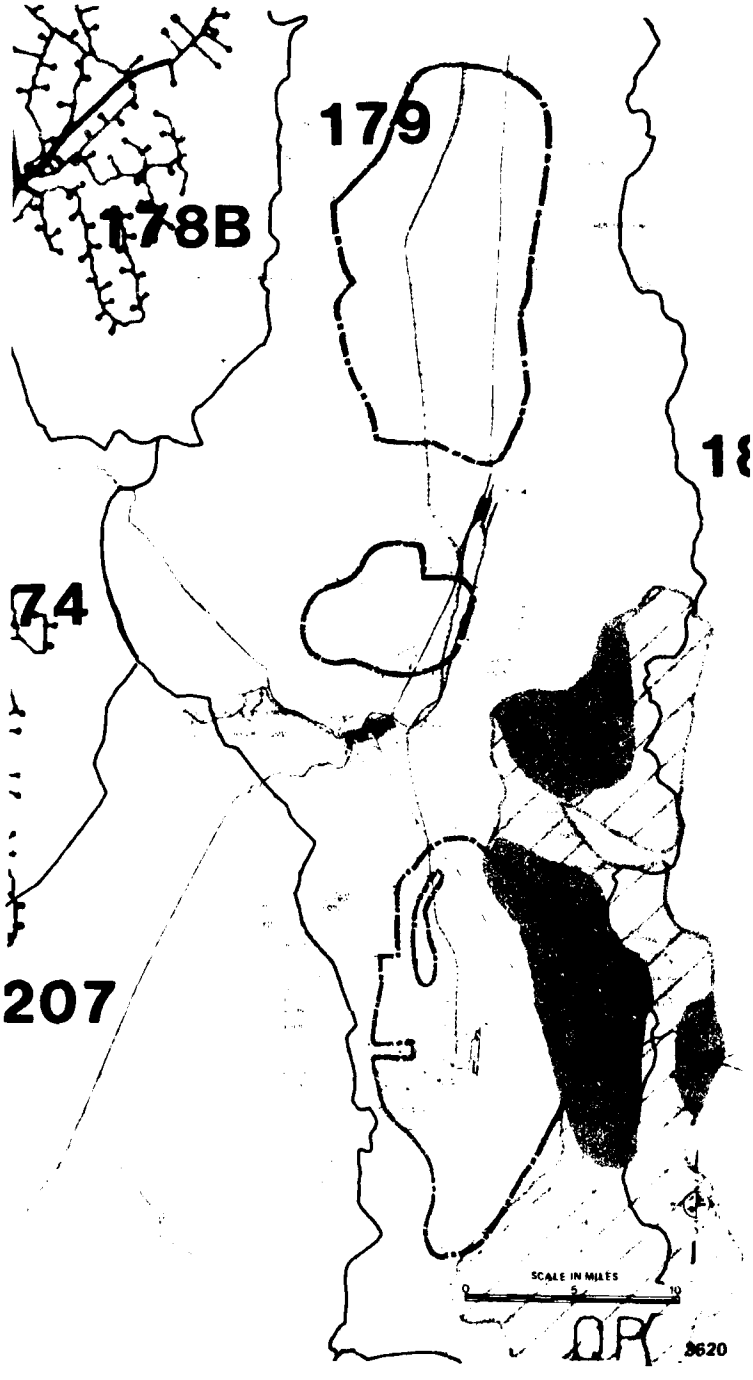


Figure 4.4.2-6. Elk range (green lines) and key habitat (solid green) in the vicinity of the Ely OB suitability area.

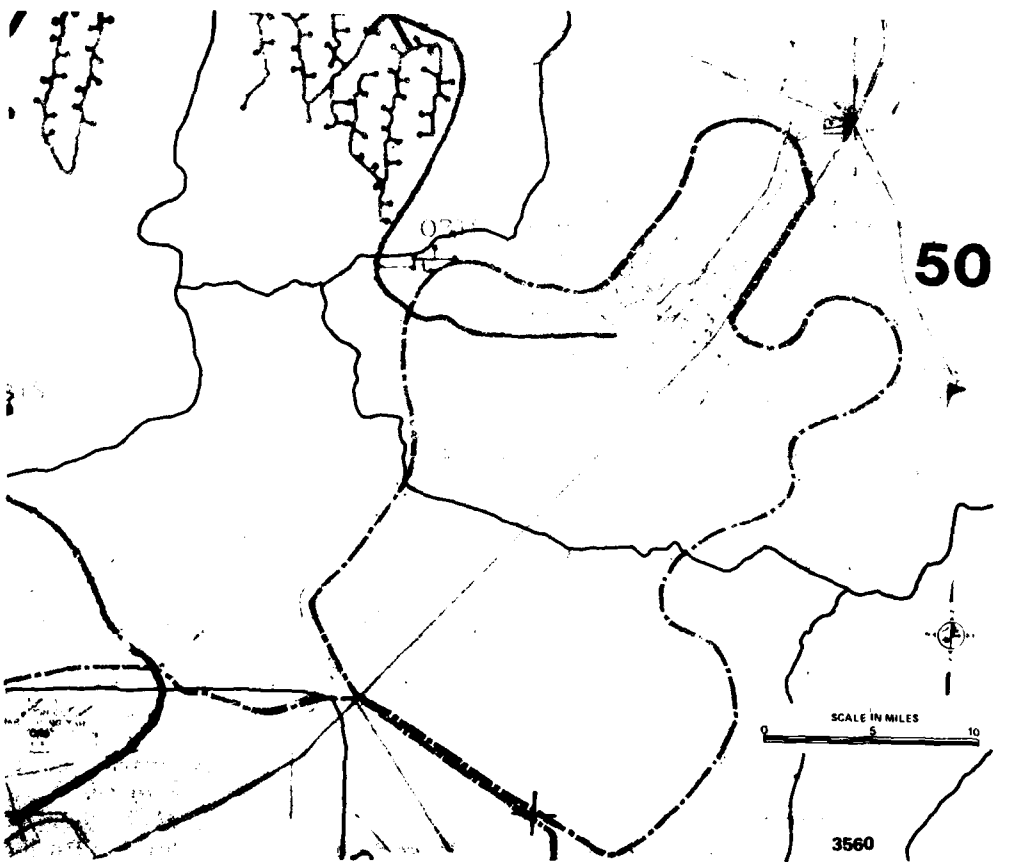


Figure 4.4.2-7. Elk range (green) in the vicinity of the Milford OB suitability area.

tion has been initiated. Impacts to these federally protected species will be fully evaluated in the Biological Assessment as required by the Section 7 Consultation.

State protected or recommended protected species have similar but less stringent sanctions. Any nonfederally protected species, however, could be elevated to federal status during project deployment and thereby require Section 7 Consultation.

Wildlife Species

Nevada/Utah Regional Impacts

Distributions of threatened and endangered terrestrial wildlife species are shown in Figure 4.4.2-8. The bald eagle, peregrine falcon, and Utah prairie dog (federally listed); spotted bat (Nevada state listed); desert tortoise (Nevada state listed and population in Utah federally listed); and gila monster (Nevada and Utah state listed) are potentially impacted by construction and operation. Habitat would be lost or disturbed through construction and urbanization. The influx of people to the deployment area would lead to increased recreational uses of the land, poaching, disturbance from noise and human presence, and habitat loss through camping, ORV use, and other activities. Dogs and cats maim and kill native animals close to human population centers (Christian, 1974; McNight, 1964). This could affect such protected species as the desert tortoise, Utah prairie dog, and gila monster which are relatively sedentary land animals.

Bald eagles in the Great Basin show two distinct feeding habits. Those wintering in the Carson Sink area, along the Humboldt River, and in White River and Pahranagat valleys are found near water, as bald eagles traditionally are (Bent, 1937; Broley, 1958; USFWS, 1975) and presumably feed on fish and ducks. Many other bald eagles in the area are found wintering in valleys with no permanent water and feed on jackrabbits (Edwards, 1969). There are no recent breeding records for this area but approximately 100 eagles winter in Nevada (Herron, Nevada Department of Wildlife, personal communication, 1980) and about 600 birds winter in Utah (Day, 1978). M-X deployment could impact bald eagles through construction in valleys in which these eagles hunt and recreational activity near their roost sites.

Much of the reason for the decline of bald eagles has been attributed to pesticides (Broley, 1958; Stickel et al., 1966) and loss of habitat due to spreading urban and recreational areas (Sprunt, 1969; Sprunt and Ligas, 1966). M-X would be constructed in valley bottoms where some wintering bald eagles feed. During construction, bald eagles will likely forage several miles from activity. But these valleys are large and eagles should be able to move to the other end of the valley to forage. No negative effects to bald eagles are expected when the clusters are operational and eagles may, in fact, benefit from the vegetation disturbance since this often leads to increased jackrabbit populations (Vorhies and Taylor, 1933). The other possible disturbance to bald eagles may occur at roost sites. Roost sites in the Great Basin are often large trees either on valley floors or in canyons (Edwards, 1969). Activity near roost sites may cause the eagles to take flight but in the absence of direct harm to these birds they should habituate to activity. Edwards (1969) noted that one group of eagles roost near the small town of Vernon, Utah, many of them roosting in trees next to farm buildings where they would regularly see humans. Also, information supplied by the Utah division of Wildlife Resources

(1979) show several large groups of wintering bald eagles near the town of Cedar City, Utah, which has a population of approximately 9,000. If roost trees are not cut down and bald eagles are not intentionally harmed, the overall impact of the M-X in Nevada and Utah should not be significant.

Endangerment of peregrine falcons has resulted primarily from accumulation of persistent pesticides, especially DDT and its metabolites (Herman, 1971; Enderson and Wrege, 1973; Porter and White, 1973; Chamberlain, 1974; Reichel et al., 1974). Nest-robbing by falconers, climatic change, and habitat disruption have also contributed to the decline of the species (Porter and White, 1973). No recent nesting has occurred in Nevada but there is some suggestion that nesting may occur in the mountains near the western desert of Utah (Porter and White, 1973). Figure 4.4.2-8 shows the areas known to have contained nesting peregrines in the last 20 years. Preferred nesting habitat is cliffs near marshes, where the peregrine feeds (Porter and White, 1973).

Although this species may tolerate activity in its area (Porter and White, 1973), recreation, such as rock climbing, which brings people directly to nest sites, would likely cause peregrines to abandon their nests. Also, recreation could be concentrated in water areas which could interfere with peregrine hunting. But since this bird is extremely rare in the study area few human/bird encouters are expected.

The spotted bat although rarely seen, is thought to occur throughout Nevada and Utah. Like many bats, the spotted bat eats insects and evidently prefers caves in desert areas (Watkins, 1977). This animal could be subjected to inadvertent harassment by recreationists exploring caves. O'Farrell (personal communication, 1980) believes these bats are very intolerant of human disturbance and once disturbed at a roost site would leave and not return for many years. These animals are also very rare and human encounters would be unlikely.

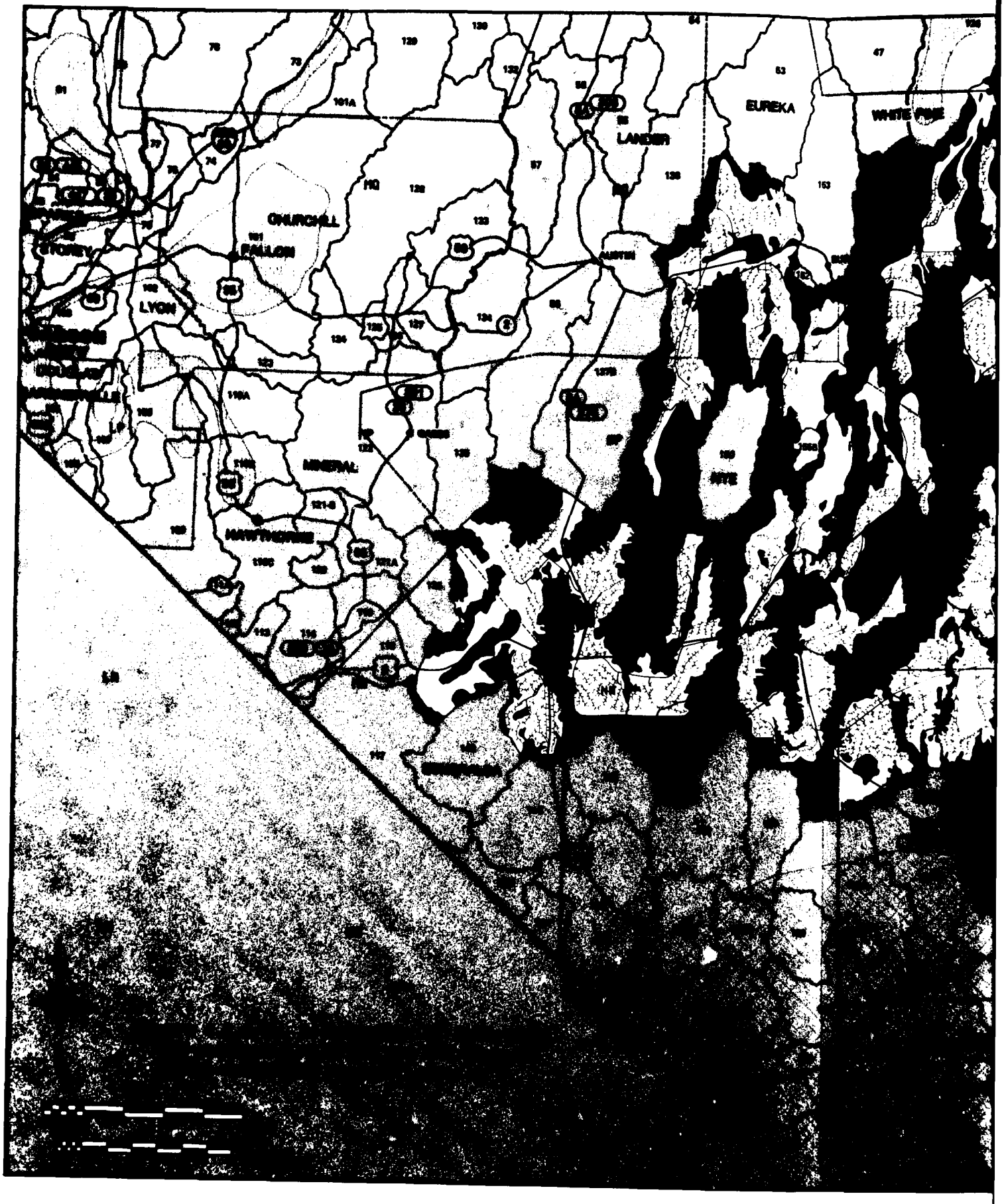
The gila monster is a large, slow-moving reptile occurring at the periphery of the study area in southern Nevada and the very edge of southwestern Utah (Figure 4.4.2-8). The gila monster has a limited range in southern Nevada; few records show the gila monster occurring very far north of Las Vegas (Bradley and Deacon, 1966). The fact that this animal is slow moving has contributed, in part, to its being often captured for sale to collectors, even though they are venomous. Roads constructed in their habitat would undoubtedly lead to increased road mortality and increase the chance of their collection. Dogs and cats harass and kill other animals (Christian, 1974; McNight, 1964) and could affect gila monsters within a mile or two of human populations. ORVs may also affect this species. Since gila monsters are very rare and only occur in the very southern end of the study area, there is little likelihood they will be severely impacted by deployment of the M-X system except potentially a base in the Coyote Spring Wash area.

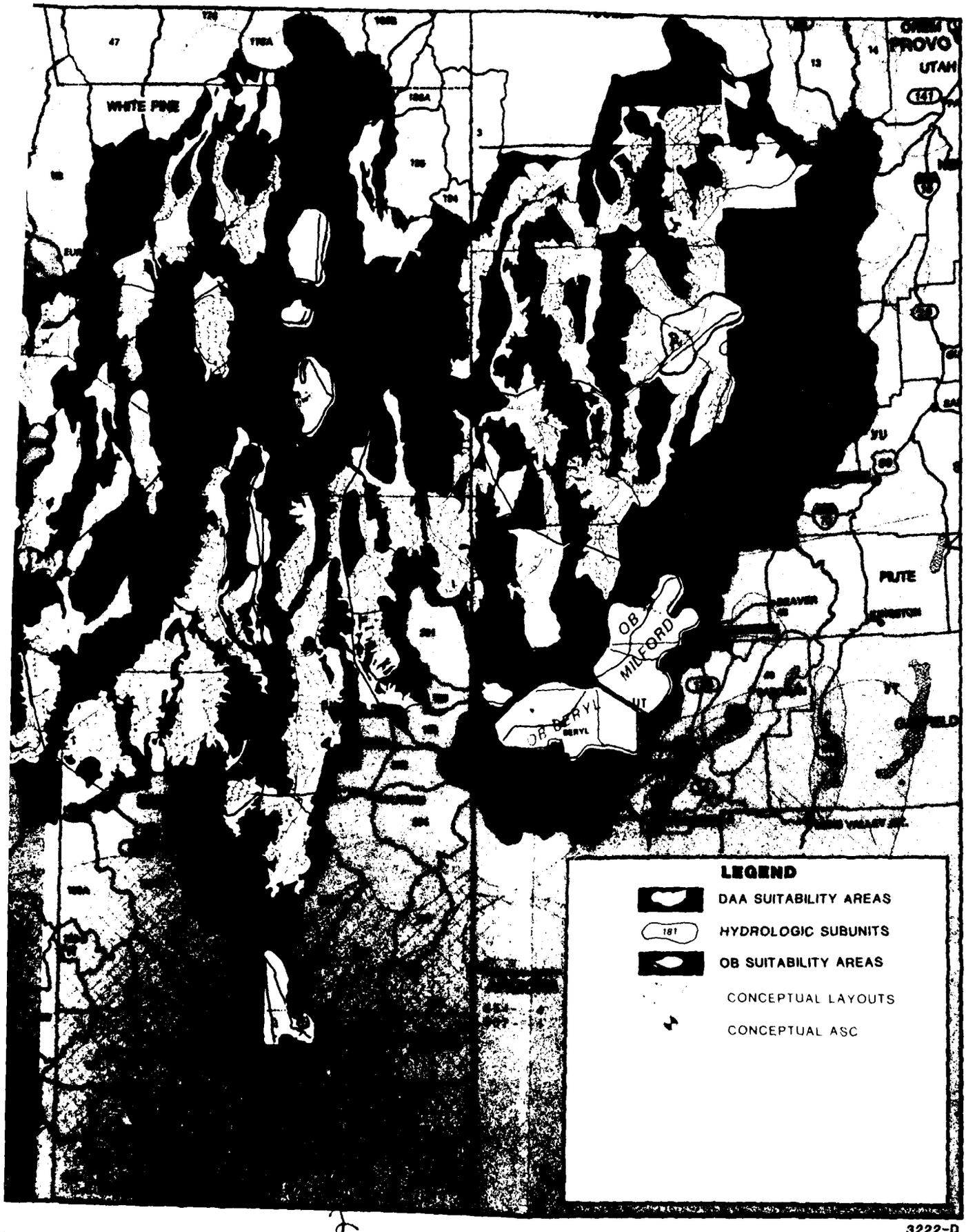
Wild horse and burro distribution in Nevada and Utah is shown in Figure 4.4.2-9. Wild horses and burros are protected under Public Law 92-195, which specifies that wild horses and burros on public lands be managed so as to "protect the natural ecological balance of all wildlife species which inhabit such lands" (Wild-Free Roaming Horse and Burro Act as amended, 1971). Construction would be more likely to affect wild horses than feral burros for two reasons: horses are much more abundant in the potential deployment areas of Nevada and Utah than are burros, and wild horses utilize valleys more than burros. Areas utilized for equipment parking

THREATENED AND ENDANGERED WILDLIFE SPECIES

LEGEND

- BALD EAGLE WINTERING AREA (ESTIMATED)
- BALD EAGLE KNOWN ROOST SITE
- DESERT TORTOISE RANGE
- DESERT TORTOISE CRITICAL HABITAT
- GILA MONSTER RANGE
- PEREGRINE FALCON: REGION CONTAINING ACTIVE NESTS SINCE 1960
- *GUILIANI'S DUNE* SCARAB BEETLE RANGE
- SPOTTED BAT SIGHTING
- UTAH PRARIE DOG RANGE


EUREKA
WHITE PINE
LANDER
CHURCHILL
FALLON
LYON
MINERAL


WHITE PINE
PROVO
UTAH
PIUTE
OB
MILFORD
UT
DB BERYL
BERYL
LEGEND
DAA SUITABILITY AREAS
181
HYDROLOGIC SUBUNITS
OB SUITABILITY AREAS
CONCEPTUAL LAYOUTS
CONCEPTUAL ASC

3222-D

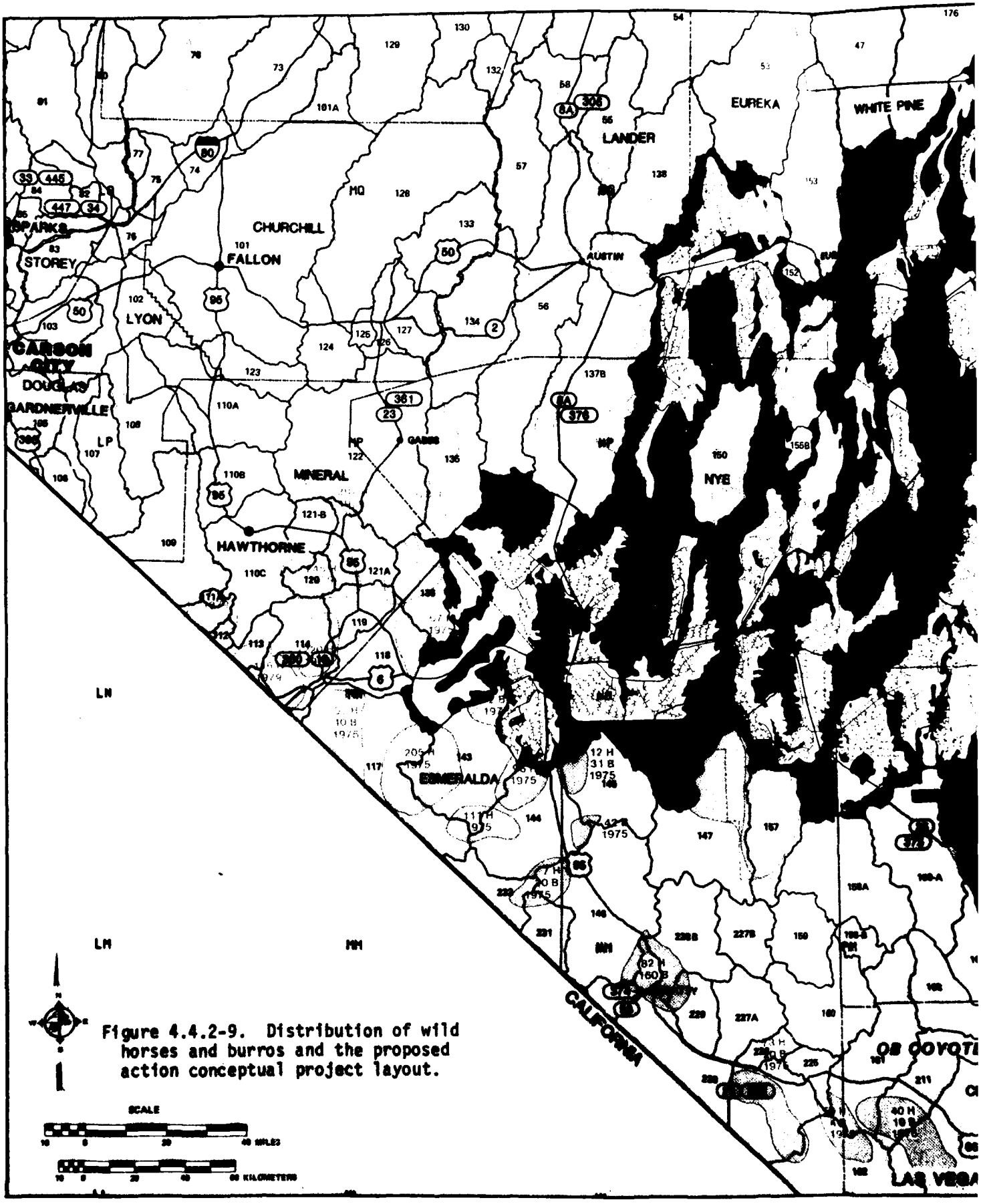
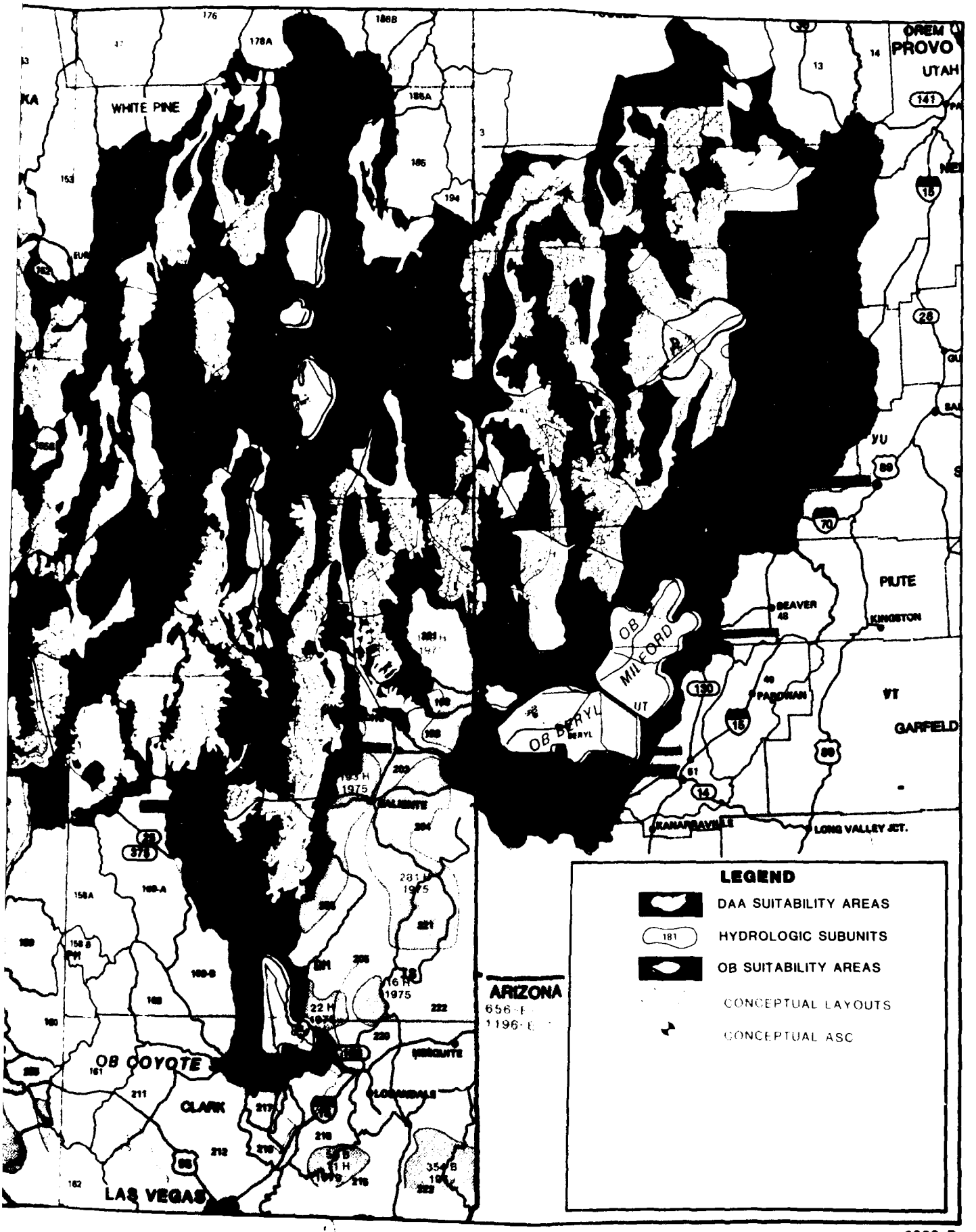


Figure 4.4.2-9. Distribution of wild horses and burros and the proposed action conceptual project layout.


WHITE PINE
CLARK
LAS VEGAS
OB COYOTE
OB MILFORD
UT
OB BERYL
BERYL
PROVO
UTAH
OREM
PIUTE
BEAVER
KINGSTON
PARAGONAH
GARFIELD
LONG VALLEY JCT.
ARIZONA
656-E
1196-E
LEGEND
DAA SUITABILITY AREAS
181
HYDROLOGIC SUBUNITS
OB SUITABILITY AREAS
CONCEPTUAL LAYOUTS
CONCEPTUAL ASC

3222-D

and maintenance, concrete mixing, materials storage, construction camps, etc., would also be excluded from use by wild horses and burros. These animals may avoid areas where activities are centered, thus reducing available habitat even further. The habitat area behaviorally excluded from use cannot be estimated. This area may decrease during the construction period within any one valley as the animals adapt to such activites.

Habitat loss or exclusion is expected to cause wild horses to move to adjacent suitable habitat or to concentrate in portions of their range which are not disturbed. This movement will increase grazing pressure in those areas. Range conditions are currently fair to poor in most areas as a result of past and present livestock grazing practices, and grazing pressure is generally at a maximum (USDI, 1980). Thus, the range would not be able to accommodate increased grazing pressure without causing increased competition with livestock and wildlife. Horse numbers are expected to decline under these circumstances as a result of disease and starvation. For the remaining animals, vigor may deteriorate because of the poor range conditions. The quality of the range would also be expected to deteriorate even further in areas where wild horses concentrate.

Once construction activities have been completed and the temporary facilities such as construction camps have been removed, wild horses and burros should be able to utilize the space among the shelters with few effects on their behavior. The presence of roads, security and surveillance facilities, and fenced shelters dispersed throughout the valleys is expected to decrease the carrying capacity of the range for these animals only by the amount of habitat actually lost. Near the OBs, indirect effects resulting from population growth are estimated to be similar to those predicted for the construction phase.

Texas/New Mexico Regional Impacts

Of the 25 protected species occurring in the potential deployment area, four; the black-footed ferret, American peregrine falcon, bald eagle, and whooping crane, are federally-listed. The three birds are casual visitors, and the ferret probably no longer exists in the areas. Deployment of the M-X system in the Texas/New Mexico region is not expected to have significant negative impacts.

Protected terrestrial animal species may be subjected to habitat deterioration and destruction, illegal shooting and capture, and competition with or predation by introduced exotic species. Habitat would be lost or disturbed by construction. Increased recreation, poaching, noise, and habitat loss will harm threatened and endangered species. Free running dogs and cats could pose a threat to small reptiles such as the Texas horned lizard and the Central Plains milk snake, and small birds, such as Baird's sparrow and McCown's longspur (Boggess et al., 1978). Because the New Mexico area is mostly rangeland, populations of these species are larger than in the agricultural areas of Texas. Extensive habitat disturbance could cause declines in the prey populations, mostly small mammals, of the various protected birds of prey, especially black hawk and zone-tailed hawk.

Excessive noise from ORVs and other recreation activities in river valleys and [illegible] canyons might disrupt behavior of little blue heron, Mississippi kite, and [illegible] as well as reptiles and amphibians.

Black-footed ferrets have not been sighted in this area, but they may exist in prairie dog towns in Roosevelt and Curry counties, New Mexico. If prairie dog towns are used as construction sites, both food source and den could be destroyed.

Operating Base Impacts

Beryl

Other than the Utah prairie dog, discussed previously, no other protected species are expected to be significantly impacted by a base located in this area.

Coyote

Bald eagles winter at the nearby Pahranagat National Wildlife Refuge and may leave the area if this refuge is heavily visited by people from the base. The gila monster may occur in the southern part of Coyote Spring Wash and could be negatively impacted by habitat destruction, recreational acitivities (particularly ORV use), and unauthorized collecting.

Delta

Thirteen sightings of bald eagles, the closest of which was approximately 8 mi from Delta, were recorded in 1979 in the area from McCormick, Utah, to Fillmore, Utah; no roost sites have been recorded in this area. Bald eagles are not expected to be impacted by construction of buildings around Delta. Peregrine falcons may nest in nearby mountains, but these mountains do no appear to be particularly attractive to recreationists, consequently few to no peregrine/human encounters are expected.

Ely

The bald eagles that forage in Steptoe Valley during the winter could be directly impacted by loss of foraging habitat and construction acitivity if either of the two suitability envelopes north of Ely are used for siting of the base. Although these areas are considered traditional use areas by the Nevada Department of Wildlife, no roost sites have yet been located. Roost sites in these areas are likely to occur in mountain canyons which would not be directly impacted by construction. Disturbance to bald eagles at roosts could result from recreational acitivies.

Milford

Bald eagles in the area near Minersville Lake State Park and those in the Wah Wah Valley may react in a manner similar to that described for populations near Ely. Bald eagles may not tolerate disturbance near their traditional roosts which are not presently near humans and may move to other traditional sites which are not visited by people (Stalmaster, 1976), although they may become habituated after several years.

Clovis

Due to the extensive agriculture in the Clovis area, there are no known protected animal species in the vicinity, although the Texas horned lizard and

Central Plains milk snake may be present, as well as migrating birds of prey. The black-footed ferret was formerly in the area, but has probably been extirpated.

Dalhart

There are no known populations of protected animals in the vicinity of the base, although migrating whooping cranes and birds of prey may pass through the area. No significant effects to protected species are expected.

AQUATIC SPECIES (4.4.3)

Nevada/Utah Regional Impacts

Impacts on aquatic habitats and species fall into three categories: direct impacts from construction and operation, and indirect impacts from increased human population.

Siting would affect aquatic species through degradation of surface water quality, physical alteration of aquatic habitats, and reductions in surface water volume and area from groundwater withdrawal. Recreational activities and introduction of exotics (nonnative fish and other aquatic biota) would be indirect sources of impacts (Table 4.4.3-1). Groundwater withdawal and recreation have the greatest potential for impact.

Runoff of sediments from disturbed soils, spilled petrochemicals, or construction materials could degrade water quality of aquatic habitats within approximately 5 mi of construction activities. Groundwater withdrawal could have far reaching impacts since most aquatic habitats in valleys are spring-fed and well locations may be some distance away form construction activities. Furthermore, valleys in the White River system are hydrologically connected so that effects of water use in one valley could affect spring flow in downslope valleys.

Large increases in human population in sparsely settled areas would affect aquatic habitats and biota through recreational activities (e.g., fishing, camping, ORV use, and swimming) and introduction of exotic species. These activities would degrade habitat quality or deplete existing populations through predation or competition.

The following hydrologic subunits rate high in both abundance and sensitivity to impact: Snake, Big Smoky-North, Monitor, Steptoe, Spring, White River, Pahranagat and Muddy Spring valleys. Mitigation measures would be similar to those discussed for Texas/New Mexico in the following section.

Texas/New Mexico Regional Impacts

Impacts on aquatic habitats and species fall into three categories: Direct impacts from construction and operation, and indirect impacts from increased human population. The river valleys, being geotechnically unsuitable, would not be heavily impacted. Playa lakes, however, would be disturbed and, in some cases, destroyed due to interruption of surface flow or physical elimination by filling. Direct impacts of construction on the river and playa lake systems derive from alteration of the land surface on adjacent geotechnically suitable uplands. Runoff fro ı rains would increase and would be expected to result in heavier loads of silt

Table 4.4.3-1. Abundance and sensitivity of impact for native fish, Nevada/Utah.

NUMBER	LOCATION	A	S	NUMBER	LOCATION	A	S
3	Deep Creek	L	L	152	Stevens	L	L
4	Snake	H	H	153	Diamond	I	I
5 (U)	Pine	L	L	154	Newark	H	I
6	White	I	H	155	Little Smokey	I	I
7	Fish Springs	I	H	156	Hot Creek	H	I
8	Dugway	L	L	169a	Tikaboo Northern	L	L
9	Government Creek	L	L	170	Penover	L	L
13	Rush	L	L	171	Coal	L	L
32b	Great Salt Lake Desert-Western	L	L	172	Garden	L	L
46	Sevier Desert	L	L	173a	Railroad-Southern	L	L
46a	Sevier Desert-Dry Lake	L	L	173b	Railroad-Northern	I	I
47	Huntington	I	I	174	Jakes	L	L
50	Milford	L	L	175	Long	L	L
52	Lund District	L	L	176	Ruby	H	I
53 (N)	Pine	L	L	178	Butte	L	L
53 (U)	Beryl-Enterprise District	L	L	179	Steptoe	H	H
54 (U)	Wah Wah	L	L	180	Cave	L	L
54 (N)	Cresent	L	L	181	Dry Lake	L	L
55	Carico Lake	L	L	182	Delamar	L	L
56	Upper Reese River	I	I	183	Lake	L	L
57	Antelope	L	L	184	Spring	H	H
58	Middle Reese River	I	I	185	Tippett	L	L
122	Gabbs	L	L	186	Antelope	L	L
124	Fairview	L	L	187	Goshute	L	L
125	Stingaree	L	L	194	Pleasant	L	L
126	Cowkick	L	L	196	Hamlin	L	L
127	Eastgate	L	L	198	Dry	L	L
133	Edwards Creek	L	L	199	Rose	L	L
134	Smith Creek	L	L	200	Eagle	L	L
135	Ione	L	L	201	Spring	L	L
136	Monte Cristo	L	L	202	Patterson	I	H
137	Big Smoky-Tonopah Flat	L	L	203	Panaca	I	H
137b	Big Smoky-North	H	H	204	Clover	L	L
138	Grass	I	I	205	Meadow Valley Wash	H	I
139	Kobeh	L	L	206	Kane Springs	L	L
140	Monitor	H	H	207	White River	H	H
141	Ralston	L	L	208	Pahroc	L	L
142	Alkali Springs	L	L	209	Pahranagat	H	H
143	Clayton	L	L	210	Coyote Springs	L	L
144	Lida	L	L	219	Muddy River Springs	H	H
149	Stone Cabin	I	I	128	Dixie	L	L
150	Little Fish Lake	L	L	129	Buena Vista	L	L
151	Antelope	L	L	132	Jersey	L	L

3019

Fish included in this analysis are: cutthroat trout, desert sucker, roundtail chubs, least chub, tui chubs, speckled dace, desert, moapa and relict dace, spinedace, springfish, and killifish.

H = high
I = intermediate
L = low

U = Utah
N = Nevada
A = abundance, denoting frequency of resource occurrence.

S = Sensitivity, relating to a combination of factors including (a) location and/or potential exposure of the resource to project effects, and (b) resource abundance. The criteria used for defining sensitivity levels are contained in the base reference document.

than normal, due to loss of vegetative cover. The small playas may suffer alteration or even destruction during construction activities if they are not deep enough to prevent construction of roads or shelters in or near them. In addition, pollution from spilled petrochemicals, construction materials, and industrial waste from onsite manufacture could enter some riverine and playa systems. Introduced pollutants differ in the two habitat types, as do their effects. In riverine systems, accumulations differ because dispersal keeps the concentrations lower than in playa lakes, which, as catchment basins, would experience increasing concentrations. The effect of these direct impacts would be alteration or reduction of habitat, which in turn, would lead to a reduction of populations of aquatic species in affected areas.

Indirect impacts are expected due to an increase in local human populations. The volume of domestic wastewater discharged and recreational pressure on the surrounding countryside would be expected to increase. Use of ORVs in river valleys could add sediment load to the streams, or, if heavy enough, damage stream beds. In dry or drying playa lake beds, it could damage emergent aquatic vegetation. An increase in game fishing, with accompanying pressure to stock exotic species, may also occur.

Abundance and sensitivity to impact for game fish, all of which are warm-water species, were analyzed and evaluated county by county using high, intermediate, and low ratings (Table 4.4.3-2). There probably would not be major adverse effects upon aquatic habitat and species.

Mitigation for adverse impacts would involve avoidance and techniques to reduce dust, erosion, pollution, and recreatioinal impact. Mitigation by avoidance on a site-by-site basis is the most feasible approach for playa lakes. The larger playas would be unsuitable due to accumulation of runoff up to a depth of several feet. Smaller playas may be suitable for siting, but should be avoided, as they are refuges for both waterfowl and upland game.

Construction activities should be done in a fashion minimizing soil disturbance and spilling of potential pollutants which would be carried by runoff into aquatic habitats, especially playa lakes, endangering the large waterfowl populations therein. Removal of vegetation should be avoided or minimized, with restoration done as quickly as possible. Construction activities should be minimized during nesting seasons, usually early summer, in rangeland and during waterfowl migration in the areas with larger playa lakes.

Increased recreational use of aquatic habitats could be mitigated through surveillance by state or federal personnel, posting of sensitive areas with signs requesting compliance with habitat protection procedures, and, as a last resort, fencing off an aquatic habitat from public use. Educational and recreational programs can acquaint M-X construction personnel and their families with the significance of aquatic habitats and can channel their energies into structured, on-site, physical programs.

Operating Base Impacts

Beryl

The only perennial aquatic habitats within 25 mi of the proposed Beryl OB are in the Pinto Creek drainage (Utah Fishing Waters Inventory, 1980). No direct

Table 4.4.3-2. Abundance and sensitivity to impact for game fishes in the Texas/New Mexico study area.

STATE/COUNTY	GAME FISHES	
	A	S
Texas		
Bailey	L	L
Castro	L	L
Cochran	L	L
Dallam	L	L
Deaf Smith	I	H
Hartley	H	I
Lamb	L	L
Moore	H	I
Oldham	H	I
Parmer	L	L
Randall	H	I
Sherman	L	L
New Mexico		
Chaves	H	I
Curry	H	I
DeBaca	H	L
Guadalupe	H	L
Harding	H	L
Lea	L	L
Quay	H	L
Roosevelt	L	L

2325

H = High
I = Intermediate
L = Low
A = Abundance, denoting frequency of resource occurrence.
S = Sensitivity, relating to a combination of factors including (a) location and/or potential exposure of the resource to project effects, and (b) resource abundance. The criteria used for defining sensitivity levels are contained in the aqautic species effects technical report.

impacts to these habitats would be expected as a result of project related activities. Fishing pessure would be expected to increase as a result of increased population in the Beryl area. Management practices, including stream restoration, stocking, and legal bag size and gear restrictions, would probably require modification to maintain acceptable fishing success levels.

Coyote

Direct impacts to aquatic habitats and species from the proposed Coyote Spring OB would be restricted to direct physical disturbance of Pahrangat Wash and its drainage system, and the downstream transport of sediments and nonpoint source pollutants toward Moapa. New residents to the area would be expected to increase fishing pressure on nearby resources. Current residents of Clark County consitute a large portion of angler-days and a high proportion of their harvest is taken from habitats far beyond the distance normally associted with recreational use drop-off distance. Table 4.4.3-3 is a sample of fishing resources beyond the normal recreational use area that are heavily used by Clark County residents. New OB residents would be closer to all of these resources and would, therefore, tend to use them at an even higher rate.

The largemouth bass pop ı ıtions in Pahrangat reservoir (in Pahranagat Valley 50-60 mi north of the potentia.)B site) probably will be reduced through increased fishing pressure as a result of increased population levels during construction and operations.

Management practices, including stream restoration, increased stocking, and legal bag and gear restrictions, would probably require modifications to maintain acceptable fishing success levels.

Delta

Although many game fish habitats are found east of Delta on the Sevier River and its tributaries, only two game fish habitats are within 25 mi of the proposed OB west of Delta. Gunnison Bend Reservoir and portions of the Sevier River provide warm-water game fisheries. No direct physical modification of game fish habitats would be expected from the construction of the proposed OB and related project features. Growth in Delta would further decrease water quality of both habitats by non-point source pollution from oils, solvents, pesticides, domestic pet excrement and other urban liquid and solid wastes. Expansion of the urban area would also result in an increase in recreational pressure including fishing, boating and other water-related activities.

Ely

Development within the suitability areas designated for the Ely OB could result in direct impacts to Duck Creek, Steptoe Creek, Willow Creek, Bassett Lake, Comins Lake, and several small creeks east of Highway 93 north of McGill. Exact placement of OB facilities would determine those that would have the potential to receive direct disturbance and would be the receiving waters for increased sedimentation loads and non-point source pollutants.

Aquatic habitats containing gamefish within 50 mi of Ely would be expected to receive the bulk of increased fishing pressure as a result of increased population

Table 4.4.3-3. Percent angler use and fish harvest by residents of Clark County at distant fishing resources.

RESOURCE NAME	DISTANCE TO POPULATION OF CLARK CO. (Air Miles)	PERCENT OF OF TOTAL ANGLER DAYS	PERCENT OF OF TOTAL FISH HARVEST
Cave Lake	220	27.2	34.8
Comins Lake	216	23.3	35.8
Haymeadow Reservoir	156	89.0	82.5
Adams-McGill Reservoir	160	34.6	16.2
White River	200	58.8	53.7
Cleve Creek	220	62.4	64.6
Baker Creek	210	61.7	44.4

3843

Source: 1979 Nevada DOW Angler Use Survey.

attracted to the new OB. Since residents of the Ely area currently constitute a substacial portion of fisherman using highly attractive resources (e.g., Comins Lake) in high numbers, use of game fish resources in Jakes, White River, Spring, Snake and Steptoe valleys is expected to increase in proportion to the increase in local population. It is estimated that 15 more law enforement officers would be required for the white Pine County area for adequate control if an OB was sited near Ely (L. Mc Lelland, 1980). Without the OB 2 to 3 officers would be necessary within 5 years. A modification of management practices, including habitat restoration, bag size and gear restrictions, and stocking rates, would be expected to maintain acceptable fishing success.

Game fisheries habitats which could be adversely impacted by expansion of Ely outside its present borders include Steptoe Creek and Comins Lake. Principal game fish in these habitats are rainbow trout, brown trout, brook trout, northern pike and largemouth bass. Current angler use of these habitats is high and is expected to increase. Indirect adverse impacts to game fish and their habitats would result from increased game fishing.

Milford

Since the proposed project facilities would be downstream of Minersville Reservoir, no direct impacts of construction or operation would be expected to affect that habitat. Portions of the Beaver River, however, would be downstream of project features, but few of the OB or other project facilities are proposed to cross or parallel the Beaver River. (All principal portions of the project are west of the Beaver River.) Indirect impacts, resulting from increased local population, would be expected to impact both habitats. Increased fishing pressure could reduce fish populations so as require modification in management practices. Habitat modification, through man's recreation, would also adversely impact these habitats.

Management practices would be expected to require modification to maintain acceptable fishing success.

Clovis

As most of the operating base will occupy Cannon Air Force Base and proposed expansion would involve agricultural land, no direct significant impacts are expected on aquatic habitats. There may be indirect impacts on riverine systems being used recreationally, but this cannot be quantified.

Dalhart

As the Dalhart OB site is near the Canadian Breaks, some siltation from erosion during construction may occur, but as erosion from farmland is already present, no effects from the Dalhart base are expected. Effects of recreational activities of project-related people are expected to be minimal.

SIGNIFICANT NATURAL AREAS (4.4.4)

Nevada/Utah Regional Impacts

Figure 4.4.4-1 shows the location of significant natural areas in the potential deployment area and the conceptual project layout. It has been Air Force practice

to avoid significant natural areas, such as national parks (including the proposed Great Basin National Park), national monuments, national forests, state and federal wildlife refuges, state parks and recreation areas as well as proposed unique and nationally significant wildlife ecosystems.

Significant natural areas already withdrawn from the multiple use sustained yield aspects of public domain land (i.e., national/state parks, wildlife refuges, management areas, and so forth) may be directly impacted only by project-related changes in air quality, noise levels, and groundwater use since it is not anticipated that project siting would occur within their boundaries. Impacts are expected to be local and short-term during construction when use of heavy machinery would produce increased ambient dust and noise levels in the vicinity of these lands. As with potential wilderness areas, proximity of M-X-related construction and operation activities could conceivably result in flora and fauna habitat deterioration or loss as a result of water table lowering which reduces water flow in low elevation springs. Other public domain lands containing as yet unidentified fragile ecosystems which are, nevertheless, de facto significant natural areas, may be subject to direct impacts by construction within their boundaries. Potential impacts of this nature could be of larger magnitude and include: (1) major habitat deterioration or loss, (2) possible alteration, reduction, and loss of genetic resources (Lovejoy, 1979), (3) loss of potential control areas for scientific research, as well as landscape destruction of geologic and aesthetic interest. These potential impacts would be the result of project activities including the construction of roads, rail lines, clusters and protective structures, support facilities and communication towers, as well as borrow pits and disposal areas.

In general, potential environmental consequences of the project on significant natural areas would be similar to those previously discussed for wilderness areas, and, depending upon their salient biological characteristics, impact discussions for vegetation, wildlife and/or aquatic species could also apply.

Texas/New Mexico Regional Impacts

Key natural areas-federal and state parks as well as reserves may be affected by M-X. This could occur directly from construction and operation and indirectly from increased recreational use. Most of the Texas/New Mexico High Plains region is either intensively cultivated or heavily used as rangeland. Natural areas, such as the playa lakes and small remnants of undisturbed shortgrass prairie are few, and direct impacts should be correspondingly low.

Indirect impacts from the work force during construction and operation might be considerable. There would be an increased demand for recreational resources, which would put user pressure on the parks and refuges in and around the area in the National Forest lands to the west. Increased use of ORVs could result in loss of habitat through destruction of vegetation, soil disturbance and in alteration of animal behavior. Increased hunting pressure, both legal and illegal, would not only strain existing facilities but might also drive animals out of the area. Whether these impacts occur at harmful levels would depend upon control of unauthorized activities and intensity of legitimate use of available recreational resources.

Grulla National Wildlife Refuge in Roosevelt County, New Mexico, has cluster elements nearby and may be impacted by construction noise and other disturbances.

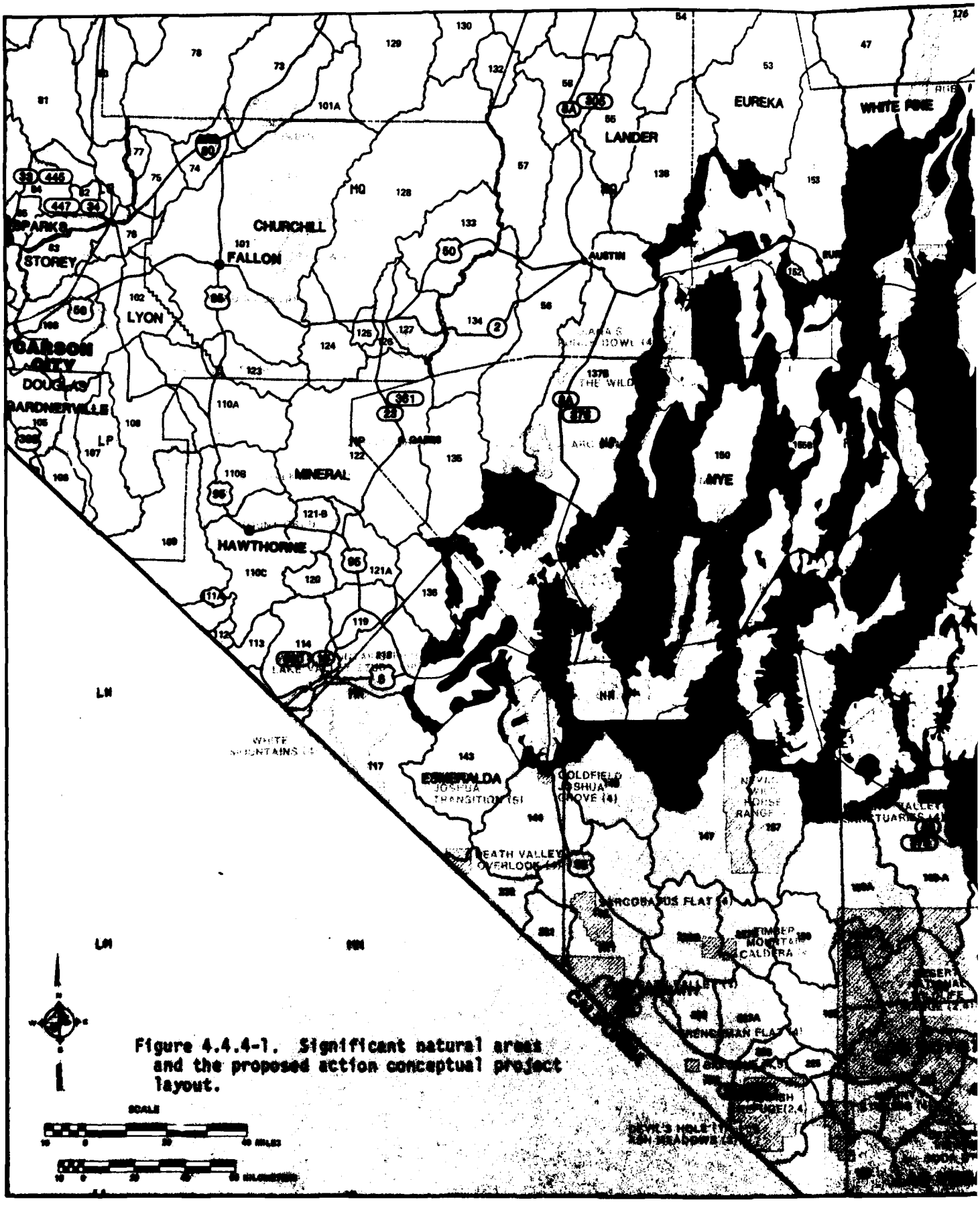


Figure 4.4.4-1. Significant natural areas and the proposed action conceptual project layout.


186A
185
194
3
201
OB
MILFORD
130
BERYL

Abundance and sensitivity to impact were analyzed and evaluated for key natural areas on a county-by-county basis using high, intermediate and low ratings (Table 4.4.4-1).

Mitigations involve siting project elements as far as possible from significant natural areas to reduce impact of noise and dust generated by construction activities. Such effects are likely to disturb wildlife and waterfowl in the National Wildlife Refuges and degrade wilderness experience.

Operating Base Impacts

Beryl

Figure 4.4.4-2 shows the base location for the Beryl site. There are no significant natural areas intersecting the base suitability envelope.

As previously discussed for wilderness in Section 4.3, impacts of the basing sites on significant natural areas area likely to be related to the recreational activities of the long-term in-migrant population. Lehman Caves, Lexington Arch, Steamboat Mountain, Cedar Breaks, Bryce Canyon, Zion National Park, Red Mountains, Indian Peak, Highland Range, Gleason Canyon, and Cathedral Gorge are areas likely to receive increased recreational use.

Coyote Spring Valley

There is no intersection of the base suitability envelope with significant natural areas; however, the Moapa Valley National Wildlife Refuge is within 1 to 2 mi of this zone.

Impacts of basing sites are likely to be related to the recreational activities of the in-migrants. Areas likely to receive increased recreational use as a result of siting a base at Coyote Spring include Pahranagat Lakes, Desert National Wildlife Refuge, Moapa Valley National Wildlife Refuge, Key Pitman Wildlife Management Area, and Valley of Fire State Park.

Delta

There is no direct overlap of the base suitability area with local significant natural areas. As noted for the Beryl OB, impacts to key natural areas as a result of siting a base at Delta would be related to the recreational activities of base personnel. Areas likely to receive increased recreational visitation would include Lehman Caves, Fumarole Butte, Topaz and Clear Lake Wildlife Management Area as well as the natural landmark, Antelope Springs Trilobite Beds.

Milford

No key natural areas occur in the Milford OB vicinity. As noted for the Beryl OB, potential impacts to significant natural areas would be due to the recreational activities of the in-migrants. Areas likely to receive increased use include the following: Wheeler Peak, Lehman Caves, Cedar Breaks, Bryce Canyon, and Zion National Park.

Table 4.4.4-1. Abundance and sensitivity to impact of key natural areas, Texas/New Mexico high plains.

STATE/COUNTY	KEY NATURAL AREAS	
	A	S
Texas		
Bailey	H	H
Castro	L	L
Cochran	L	L
Dallam	H	H
Deaf Smith	L	L
Hale	L	L
Hartley	L	L
Hockley	L	L
Lamb	L	L
Lubbock	L	L
Moore	I	I
Oldham	L	L
Parmer	L	L
Potter	I	I
Randall	H	H
Sherman	L	H
Swisher	L	L
New Mexico		
Chaves	H	H
Curry	L	L
DeBaca	I	I
Guadalupe	I	I
Harding	H	I
Lea	L	L
Quay	I	H
Roosevelt	H	H
Union	H	I

2329-1

H = High
I = Intermediate
L = Low
A = Abundance, denoting frequency of resource occurrence.
S = Sensitivity, relating to a combination of factors including (a) location and/or potential exposure of the resource to project effects, and (b) resource abundance. The criteria used for defining sensitivity levels are contained in the base reference document.

AD-A104 360 AIR FORCE SYSTEMS COMMAND WASHINGTON DC F/G 5/3
DRAFT ENVIRONMENTAL IMPACT STATEMENT. MX DEPLOYMENT AREA SELECT--ETC(U)
DEC 80
UNCLASSIFIED AFSC-TR-81-60 NL

4 OF 4
AD A104360

END
DATE FILMED
10 81
DTIC

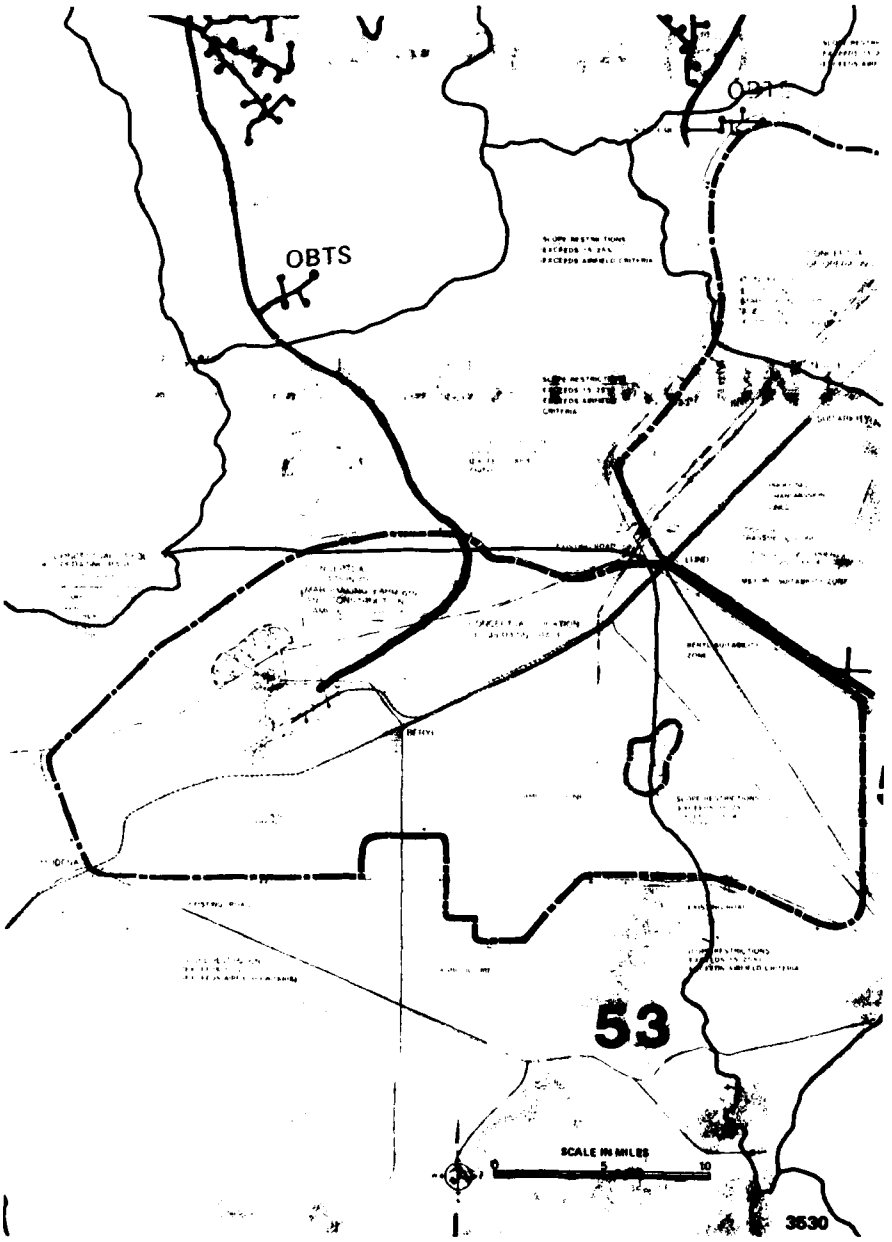


Figure 4.4.4-2. Beryl suitability envelope and significant natural areas (green).

Ely

As noted for the Beryl OB, impacts to key natural areas would be primarily due to the recreational activities of base personnel and associated in-migrants. Areas likely to receive increased visitation as a result of siting a base at Ely would include Wheeler Peak, Lehman Caves, Lexington Arch, Ruby Lake, Heusser Mountain, Hercules Gap, Mt. Grafton, Mt. Moriah, Spring Valley White Sage Flat, Shoshone Pygmy Sage Area, and Preston Big Springs.

Clovis

The nearest significant natural area to the Clovis operation base is the Grulla National Wildlife Refuge (established to protect the lesser sandhill crane), 20 mi to the southeast and closed to the public. There are extensive sandhills between the proposed base and Grulla National Wildlife Refuge. There are few biologically sensitive areas in the vicinity of Clovis.

Dalhart

The Canadian Breaks, mostly rangeland, are adjacent to the Dalhart OB site. No other biologically important areas are nearby. As the Canadian Breaks land is privately held, no significant direct or indirect effects are expected.

★ U.S. GOVERNMENT PRINTING OFFICE 1981 O - 721-985 REGION 3-1

END

DATE
FILMED
10-81

DTIC